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Oral Session O01/Orthodontics – Growth and Development

O01-1

Autogenous transplantation of impacted canines

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Introduction: Canine auto-transplantation is a surgical procedure applied in cases of ankylosed or severely displaced impacted canines. This study describes the transplantation method, as well as clinical cases where surgical intervention helped continue and complete orthodontic treatment.
Case presentation: Two patients with history of surgical exposure and failure of managing impacted canines with orthodontic traction only, are presented. The successfully autogenous transplantation of the impacted teeth is demonstrated.
Discussion: Literature review shows that canine auto-transplantation has, with minor variations, a wide range of applications and is almost always accompanied by or forms a part of comprehensive orthodontic treatment. It offers an alternative solution for managing complications and provides long-term stability. Method selection should be performed following thorough diagnosis taking into consideration the extent of surgical intervention necessary.
Conclusion: Surgical transplantation of impacted canines constitutes a good treatment alternative with long-term stability for management of complications during settlement of impacted canines in the dental arch. If the method is to be applied instead of the usual procedure used for impacted canines, it should be performed selectively and in cases where the conventional method including surgical exposure and orthodontic traction has failed. Modern diagnostic radiographic methods play a major role in correct decision-making.

O01-2

Examination of antimicrobial and anti-inflammatory effect of chlorhexidine gel in patients undergoing orthodontic fixed treatment

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Introduction: Children with fixed orthodontic appliances are highly predisposed for dental plaque accumulation. Negligence towards oral hygiene, and obstacles of these appliances for proper tooth brushing, increases the odds of caries occurrence and gingival inflammation.
Aim: The aim of the study was to evaluate the antimicrobial and anti-inflammatory effect of a chlorhexidine containing gel (Cervitec Gel, Ivoclar-Vivadent) in patients undergoing orthodontic fixed treatment.
Design: The study evaluated mutans streptococci colonies, plaque and gingival bleeding index in 30 children of the 13–16 years-old. The same parameters were evaluated after 3 months. Children were instructed to brush their teeth on a regular basis, and then to apply Cervitec Gel with a toothbrush and interdental-brush for 3 months daily in the evening. The oral health-care gel contains 0.2% chlorhexidine and 0.2% sodium fluoride. The statistical analysis was done using *t*-test and ANOVA.
Results: The baseline counts of mutans streptococci were very high (CFU $\geq 10^5$). After the application Cervitec Gel, the microbiological analysis showed a significant reduction of mutans streptococci. The 3 month period of daily tooth brushing with the oral health care gel showed decrease of bleeding index from 0.18 to 0.10 and of plaque index.
Conclusion: The daily application of a chlorhexidine containing gel, in patients with fixed orthodontic appliances, resulted in a significant reduction of mutans streptococci and bleeding index within 3 months. The results suggest that the gel application may help to improve the oral health status in children with high mutans streptococci counts, especially in children with these appliances.

O01-3

Managing class III malocclusion

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Introduction: Class III malocclusions are due to genetic factors, environmental influences, or combination of both. Class III malocclusions appear with four distinct types of malocclusions: (i) pseudo- class III, (ii) midface deficiency, (iii) true mandibular prognathism and (iv) midface deficiency and mandibular prognathism.
Case reports: Four different cases of class III malocclusions are presented. Diagnosis and differential diagnosis was based on the following: (i) Discrepancy in mandibular positioning from centric relation to centric occlusion, (ii) Counterpart analysis of Enlow, (iii) Bolton cephalometric standards. Case 1: Pseudomesiocclusion or mandibular pseudoprognathism. The patient exhibited: anterior crossbite, width discrepancies of the dental arches, forward shift of the mandible on closure and was treated withremovable appliance in the maxilla followed by fixed appliances. Case 2: Mid-face deficiency. The patient exhibited: class III skeletal pattern, underdeveloped maxillanormal mandible and was treated by face mask followed by fixed appliances. Case 3: Mandibular prognathism. The patient exhibited: class III skeletal pattern, oversized mandible, normal maxilla, and was treated with fixed appliances. Case 4: Mid-face deficiency plus mandibular prognathism. The patient exhibited: class III skeletal pattern, underdeveloped maxilla, oversized mandible and was scheduled for orthognathic surgery.
Comments: Reestablishment of normal function and occlusion is considered the most important treatment approach to prevent excessive mandibular growth or midface deficiency that results in a class III malocclusion. Treatment of class III orthodontic problems may be initiated at the early mixed dentition period.

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O01-4

Incisor apical root resorption after orthodontic treatment of impacted maxillary canines. A radiographic study

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Background: Maxillary canine impaction has been thought to increase the severity of orthodontic root resorption.
Aim: The purpose of the study was to evaluate maxillary canine impaction as risk factor for orthodontic apical root resorption. The effect of characteristics of impaction on root shortening was also studied.
Design: The sample consisted of 66 patients treated with fixed appliances. Thirty-two patients with a unilateral impacted maxillary canine formed the case-group, while 34 patients without impactions served as controls. Crown and root lengths of the maxillary incisors were measured on pre- and post-treatment intraoral radiographs. Percentage of root shortening and root length loss in millimetres were assessed. Inclination of the eruption path of the impacted canine relative to midline, axis of the lateral incisor, and nasal line, root development, medial and vertical position of the impacted tooth were recorded on orthopantomograms and lateral cephalometric films. Follicle/tooth ratio was evaluated.
Results: No significant difference on orthodontic root resorption of maxillary incisors was detected between patients with and without canine impaction. Likewise, no difference was found at incisors root shortening between impacted and non-impacted side. Mesial and vertical inclination of impacted canine was negatively related to root resorption of a lateral incisor. No correlations were found between resorption and the medial or vertical position of canine crown. Follicle/tooth ratio was significantly related to mesial inclination of impacted canine, but not to root resorption.
Conclusions: Concluding, impacted maxillary canine does not seem to be a risk factor for apical root resorption during orthodontic treatment.

O01-5

A proposed mechanism for congenitally missing teeth – basic and clinical evidence

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Background: Although the development of normal dentition has been explored extensively, the mechanisms underlying congenitally missing teeth are far less understood.
Aim: Our aim was to propose a novel mechanism for the congenital absence of teeth using a mouse model and corroborating it with clinical evidence.
Design: We compared H&E stained serial sagittal sections of wild-type and EL mice that are congenitally missing 3rd molars (3M). 3M development was followed longitudinally in both types of mice. Occurrence of apoptosis was examined using a fluorescent TUNEL assay. To determine if a similar process might account for congenital absence of human teeth, we examined serial radiographs of developing dentitions.
Results: In EL mice, congenital absence of 3M is caused, not by a failure of initiation of tooth development rather; tooth development is initiated and subsequently arrested during early cap stage. This arrested tooth primordium is subsequently removed physiologically by apoptosis. Examination of serial radiographs where missing teeth were identified lent further evidence to support this hypothesis. Follicle spaces, with no calcified tissue within them, were noted at early stages which were seen to remodel and eventually blend with adjacent bone. Permanent teeth failed to develop in those locations.
Conclusions: Based on the animal and human data, we propose a new model for congenital absence of teeth. Validation of this model could have profound clinical implications. If the genetic mechanisms involved in this proposed mechanism can be elucidated, it might lead to non-surgical management of supernumerary teeth.

O01-6

Use of Haavikko's method to assess tooth development in Chinese children

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Background: Estimating dental development radiologically is widely used.
Aim: To investigate the accuracy and precision of Haavikko's method in estimating dental age (DA) in healthy Chinese children and to investigate dental development in hypodontia.
Design: Six hundred and thirteen panoramic photographs of healthy Chinese children were retrospectively reviewed. Dental age (DA) and dental age in the left mandibular quadrant (DALM) were calculated using Haavikko's method. A group of children (47 males and 47 females) with hypodontia were compared to a matched group. Differences and correlation coefficients were statistically analyzed using paired *t*-test and Spearman correlation test.
Results: Intra-examiner and inter-examiner κ values were 0.901 and 0.848 respectively, indicating a high reliability of Haavikko's method in this study group. The mean difference between DA and chronological age (CA) of the samples was 0.14 years. The correlation coefficient between the two was 0.934. For DA and DALM, the mean difference was 0.05 years, and correlation coefficient was 0.995. Tooth formation in children with hypodontia was significantly delayed compared to the control. The mean difference was 0.57 years. The severity of the hypodontia correlated with the magnitude of the delay.
Conclusions: Haavikko's method has a high degree of accuracy and precision when applied in this Chinese population. DA may be simplified by DALM to estimate dental ages. Development of residual teeth in children with hypodontia was significantly delayed. Association was found between severity of hypodontia and magnitude of delay.

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O01-7

Porphyromonas gingivalis biofilm formation on different types of orthodontic brackets

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Background: Fixed orthodontic appliances in the oral cavity contribute to the protection of bacteria from removal forces, influencing quantitatively and qualitatively the growth and accumulation of Dental Microbial Plaque. This can lead to various pathological situations such as caries and periodontal disease.
Aim: To examine the interaction between *P. gingivalis* and different types of orthodontic brackets *in vitro*, and the effect of an early salivary pellicle and other bacteria on the formation of biofilms.
Design: Mono-species *P. gingivalis* ($n = 6$ for each type of bracket) and multi-species biofilms ($n = 6$ for each) were allowed to form *in vitro*, with and without an early salivary pellicle on three different bracket types (stainless steel, ceramic and plastic). The brackets with the bacteria were anaerobically incubated for 3 days in Brain Heart Infusion Broth to form biofilms. Bacteria were quantified by enumeration of the total viable counts of bacteria recovered after trypsin treatment and culturing of adhering bacteria.
Results: The effect of saliva was found to significantly affect ($P < 0.001$) the adhesion and biofilm formation of *P. gingivalis* on the different brackets (higher numbers for coated). No significant effect was detected for the impact of the type of biofilm (mono-*versus* multi-species), although on stainless steel and plastic brackets there was a tendency for higher numbers of the pathogen to be found when considering multi-species biofilms.
Conclusions: The salivary pellicle facilitates the adhesion of *P. gingivalis* and biofilm formation on orthodontic brackets, while the presence of early colonizing bacteria leads to higher number of bacteria.

O01-8

The role of periodontal ligament stem cells in physiological root resorption of human primary teeth

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Background: To investigate the role of periodontal ligament stem cells (PDLSCs) in physiological root resorption of human primary teeth.
Design: PDLSCs from early, mid and late resorption stages of human primary teeth were isolated, cultured and identified. PDLSCs isolated from healthy human permanent teeth were used as control. Gene expressions of PDLSCs, including osteogenesis related gene Runx-2, ALP, OPG, osteoclastogenesis related gene RANKL and inflammation related gene IL-1, IL-6, TNF-α in each of the three resorption stages of primary teeth and healthy permanent teeth, were examined by Quantitative-Polymerase Chain Reaction and Western blot assay.
Results: With the root resorption proceeding, the expressions of osteogenesis related genes (RUNX-2 and ALP) and inflammation related genes (IL-1, IL-6 and TNF-α) were up-regulated gradually. The osteoclastogenesis related gene RANKL was also up-regulated during this process. On the contrary the osteogenesis related gene OPG was down-regulated and this was different from other osteogenesis related gene expression. Accordingly, the trend of osteogenesis/osteoclastogenesis, reflected by the ratio of RANKL/OPG, was up-regulated. Each related gene expression of PDLSCs in permanent teeth was at an intermediate level between those of the early and mid absorption stage of primary teeth.
Conclusions: PDLSCs may actively regulate the ratio of osteogenesis, osteoclastogenesis and inflammation related gene expression to achieve a trend of osteoclastogenesis, thus to promote primary root resorption and the successor permanent tooth eruption. Further work should focus on the interrelationships between those genes and the exact signal pathway that regulates those gene expressions.

O01-9

Dental age estimation of Greek children using Demirjian's method

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Background: Age estimation is important for several reasons.
Aim: The aim of this study is to test Demirjian's method applicability in Greek children.
Design: In this retrospective study, the sample comprised orthopantomograms randomly collected from healthy Greek children, attending the Dental School, University of Athens and a private dental clinic in the Athens area, seeking dental treatment. The final sample consisted of 617 children (269 were males and 348 were females) of know chronological age and gender, age ranged 5.25–16.75 years. The orthopantomograms were scored according to the criteria given by Demirjian *et al.* (1973) based on the study of the seven left mandibular teeth. Ridge regression analysis was performed due to the fact that the seven developmental stages of Demirjian's method are correlated. Pearson Correlation Coefficient (r) was also performed, to test the correlation between Chronologic Age (CA) and Estimated dental age (EA). For the statistical presentation we have used the means (m) and one standard deviation (SD).
Results: There is a small number of children that appears to present higher dental age than their chronological age and the *vice versa*. There is a moderate to high correlation between chronological age and dental age in both sexes in a statistical significant level.
Conclusions: Demirjian's method may be adequate for dental age assessment, in the younger age groups of Greek children. Nevertheless, it seems that the standards of dental age described by Demirjian *et al.* in 1973 and 1976 may not be suitable for Greek children.

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Oral Session O02/Cariology 1

O02-10

Mother's health and lifestyle in pregnancy and early life as risk indicator for caries in preschool children

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Background: Identification of children at risk of developing caries in early life should preferably be done before clinical caries is diagnosed. Based on previous research it was hypothesized that mothers' general health and lifestyle in pregnancy and the children's early life were associated with caries experience in early childhood.
Aim: The objective of the study was to explore whether mothers' general health, diet, physical activity, weight and smoking habits during pregnancy and children's very early life was associated with caries experience in children at 5 years of age.
Design: This study was based on the Norwegian Mother and Child Cohort Study conducted by the Norwegian Institute of Public Health and on data from The Public Dental Services. A total of 1348 children were followed from pregnancy to 5 years of age. Questionnaires were completed by the mother twice during pregnancy and when the child was 6 months, 18 months and 5 years old. Clinical and radiographic dental examination of the child was performed at 5 years of age.
Results: Multiple logistic regression showed that caries experience at the age of 5 years were significantly associated with having mother defined as obese (OR 2.4, CI 1.3–4.2), having mother with diet containing more sugar than recommended (OR 1.6, CI 1.1–2.4), having one or both parents of non-western origin (OR 4.3, CI 2.0–9.1) and having mother with low education (OR 1.5, CI 1.0–2.3).
Conclusions: Mother's weight and diet early in pregnancy was associated with caries experience in preschool children.

O02-11

Caries-related dentine mineralization in children and adults

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Background: With age, the permeability of dental enamel in humans decreases while its mineralization increases. It can be assumed that the degree of dentine mineralization also varies depending on age.
Aim: To examine the degree of dentine mineralization in permanent teeth in children and adults with caries.
Design: A total of 31 patients of 6–30 years of age have been examined and treated. The Group 1 of 15 subjects (30 teeth) were adults aged 18–30 with caries in fully mineralized permanent teeth. The Group 2 (16 subjects, 25 teeth) were children of 6–14 having caries in permanent teeth with incomplete mineralization. In both groups the fluorescence analysis of mineralization levels was conducted by Kavo-Diagnodent before and after removing demineralized dentine. The measurements were taken in conditional units (c.u.).
Results: Prior the removal demineralized dentine measurements were 22.8 ± 8.36 in the Group 1 and 32.12 ± 17.01 (with $P \leq 0.01$) in the Group 2, and the mineralization level reduced to 26.8%. After removal of the demineralized dentine, the rates of dentine went down to 8.23 ± 3.98 in Group 1 and to 29.25 ± 15.7 in Group 2 (with $P \leq 0.001$), the degree of mineralization of dentin in the adults proving to be 71.87% higher than in the children.
Conclusions: The level of mineral content in demineralized dentine in permanent teeth is lower in children than in adults.

O02-12

A clinical study of a laser fluorescence device for detection of approximal caries in primary molars

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Aim: To evaluate the diagnostic efficacy of laser fluorescence in detection of approximal caries in primary molars and to find out its reference cutoff points.
Design: Two hundred and sixteen primary molars from 96 children aged 5–9 years old were recruited in this study. In initial screening, visual inspection was performed to select target primary molar with dubious caries in a contact approximal surface. Bitewing radiograph and laser fluorescence examination were applied to detect the approximal caries for target molars. The opposite approximal surface of the target tooth would be thought as control. Visual inspection, bitewing radiograph and laser fluorescence examination were applied to detect the approximal caries for both target and control surfaces of the molars.
Results: Two hundred and fifty-six surfaces from 216 primary molars were evaluated, 128 were intact, 39 had white spot lesions and 89 were cavitated. The sensitivity of vision inspection, bitewing radiograph and laser fluorescence were 50.00%, 89.06% and 84.62%. The reference cutoff points of laser fluorescence were 0–7 = intact surface; 8–16 = demineralization without cavity; ≥17 = cavity needing invasive treatment.
Conclusions: The laser fluorescence could be considered as an alternative to radiographs in detection of approximal caries in primary molars.

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O02-13

Change of treatment plan after taking bitewing radiographs in young children

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Background: Dentists don't take radiographs very often in children under the age of 6. That often requires a special skill or they consider it unnecessary. The association of Paediatric Dentistry (EAPD) guidelines, for use of bitewing radiographs in children, recommends to consider taking bitewings for each 5-year-old child.
Aim: To determine the diagnostic value of bitewing radiographs in making a treatment plan at young children.
Design: In a total of 184 young children (age between 2 and 7 years old, mean = 4.3, SD = 1.2), treated in general anesthesia (GA), three different pediatric dentists made treatment plans by clinical judgment only, using mirror, probe to remove dental plaque, light and air. After taking bitewing radiographs they made a second treatment plan.
Results: In a total of 184 patients, 1380 molars were diagnosed for possible treatment. In 24% the treatment plan changed after examining the bitewing radiographs. Proximal caries was missed in 21% of teeth. When the child is 2 years old the chance of missing proximal caries is 3% and this percentage increases with growing age, with the highest percentage in 5 year old children (37%). Furthermore, in the second treatment plan 30% more extractions were done than were planned in the first treatment plan. This percentage was at its height when children were 3 years old (36%).
Conclusions: Bitewing radiographs are a necessary diagnostic tool in making treatment plans in children. Specific reasons vary with age.

O02-14

Dermatoglyphics: can we print the caries risk out?

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Background: Dermatoglyphic traits, with proved heritability, have been used as diagnostic aid in numerous medical and dental disorders. Early Childhood Caries (ECC) has emerged as a major oral disease in the developing nations. Dermatoglyphic analysis can facilitate easier and more economical identification of the high risk groups of ECC, for its timely prevention.
Aim: To evaluate the genetic basis of susceptibility to ECC using dermatoglyphics and to establish the dermatoglyphic parameters of fingers and palms as its valid markers.
Design: It was designed as an *in-vivo* double blind study comprising of non syndromic and socio-economically matched subjects, 300 in the experimental group -Children with Early Childhood Caries (CECC) 24–71 months old and 300 in the control group – caries free children (CF) 72–84 months age.
Results: Patterns on 1st finger of right and left hand showed: Ulnar loops to be the dominant pattern in CF and Whorl in CECC. Finger ridge counts in CF were significantly higher in 1st finger of right and left hands. Total finger ridge count too was higher in CF (mean 163.92 SD 40.27) >CECC (mean 148.90 SD 48.36). Right palm′s tda angle was higher in CF while their dat angle was lower. Palmer ridge counts also showed a significant difference.
Conclusions: The association between heritable finger and palmer dermatoglyphic parameters and ECC suggests the genetic basis of susceptibility to ECC. There is a possibility of using dermatoglyphic parameters as economical and credible markers for ECC.

O02-15

Self-esteem, obesity and oral health among adolescents in United Arab Emirates

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Background: The association between being overweight and physical health such as cardiovascular disease, diabetes and hypertension has been demonstrated, whereas the relationship between obesity and psychological well-being is controversial. Oral disease is a common problem, it is not generally life threatening. However, the consequence of oral disease may disrupt physical functionality as well as psychological wellbeing including social relationships, appearance, smiling and self-esteem. Association between oral health and self-esteem is mainly focused on aesthetics or oral health behavior rather than caries.
Aim: The aim of this study was to explore the psychological consequences (self-esteem) of poor oral health and obesity of 11–17 year old adolescents in United Arab Emirates.
Design: This cross sectional study was designed to investigate the relationship between obesity (BMI) and oral health (DMFT and tooth brushing habits) and self-esteem (Rosenberg scale questionnaire) among adolescents in United Arab Emirates.
Results: The sample included 803 participants, of whom 406 (51%) were male. The mean Rosenberg Score was 19.8 (SD ± 3.8) and ranged from 19.1 to 20.5. There was no statistically significant difference noted between both overweight and obese in comparison to normal weight as well as decay *versus* no-decay. However, Self-esteem was associated with tooth brushing in that adolescents with higher self-esteem were more likely to brush their teeth.
Conclusions: The final multivariate regression model confirmed that Age was positively associated with Rosenberg self-esteem score, the older children had significantly ($P = 0.001$) higher self-esteem level. BMI was negatively associated ($P = 0.006$) and ethnicity was also significantly ($P = 0.004$) associated with self-esteem.

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O02-16

Correlation between caries activity and plaque aciduricity. Support for the ecological plaque hypothesis

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Background: The ecological plaque hypothesis for caries pathogenicity implies the microbial shift towards a more acidogenic and aciduric dental plaque microflora, due to the frequent carbohydrate intake. Certain plaque bacteria exhibit metabolic activity, at a low pH. A correlation exists between the increased numbers of some aciduric bacterial species, e.g. mutans streptococci and lactobacilli, and caries activity.
Aim: To study the acidogenic (acid production/mg plaque × min, at pH 7.0) and aciduric potential (acid production × min, at pH 5.5/acid production × min, at pH 7.0) of dental plaque in relation to the caries activity of the patient.
Design: Samples of dental plaque were collected from caries free or caries active adults and children. Plaque suspensions in MOPS (pH 7.0) or MESH (pH 5.5) buffer containing glucose and inorganic salts were incubated for 10–20 min. The production of lactic acid in the suspensions was determined enzymatically. At a subsequent phase, the acidogenic and aciduric potential were studied in plaque of caries active adults after chlorhexidine mouthwash for 1 week.
Results: In caries free children, the acidogenic potential was 0.11–0.28 (mean 0.18), whereas the aciduric potential 0.2–0.8 (mean 0.52). In caries active children, statistically higher potentials, 0.08–0.86 (mean 0.4) and 0.12–1.51 (mean 0.61), respectively, were recorded. A similar pattern was found for the adults. Chlorhexidine treatment significantly reduced the two potentials.
Conclusions: Caries activity correlates with the acidogenic and aciduric potentials of dental plaque, this being in accordance with the ecological plaque hypothesis.

O02-17

Evaluation of a school based mouth rinsing program to control caries

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Background: Approximately 50% of school aged children from low SES background in Queensland have significant dental caries which is poorly controlled by traditional prevention and surgical intervention.
Aim: To evaluate the efficacy of antimicrobial mouth rinsing to control active dental caries in 5–12 year old children at two regional schools.
Design: A randomised clinical trial design was approved by the HREC from two regional health districts and informed consent was given by a parent for each volunteer child participant. Children were randomly assigned to case (sodium hypochlorite) and control (xylitol/fluoride) mouth rinsing groups. Each child's dentition was examined clinically and radiographically and their baseline caries experience recorded using dmfs and DMFS indices. Supervised mouth rinsing for 30 s was performed for 18 school days, four times annually. Independent dental review examinations were performed biannually until trial completion. Group caries increments ($\Delta d + D$ and Δcaries index) were compared at 24 months using the ANOVA procedure at 0.05 level of significance.
Results: Two hundred and eighty-one caries active children were recruited at baseline and 180 were followed for 24 months. Mean baseline and 24 month $\Delta d + D$ were 4.8 ± 7.3 and 1.3 ± 2.8 respectively. Caries progression reported as $\Delta d + D$ and Δcaries index was lower in the antimicrobial group at 24 months (-4.1 ± 6.9 and -2.4 ± 5.6, $P = 0.07$ and -2.4 and 0.1, $P = 0.02$).
Conclusion: Antimicrobial therapy with sodium hypochlorite mouth rinse was more effective in reducing caries increment compared with combination xylitol and fluoride mouth rinses. This study was supported by a Queensland government clinical research grant and Oral Biotechnologies, USA.

O02-18

Surface-specific efficacy of fluoride varnish in caries prevention in the primary dentition: results of a community randomized clinical trial

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Background: Fluoride varnish (FV) is efficacious in caries prevention although its effects among different tooth surfaces are poorly understood.
Aim: To determine if caries-preventive effects of a community intervention that included FV application varied according to tooth anatomy and baseline tooth pathology.
Design: Secondary analysis was undertaken of data from a community- randomized controlled trial among 543 3–5 year old Aboriginal children in 30 Northern Territory Australian communities. Children in intervention communities received community health promotion and FV application once every 6 months. Crude, net and adjusted (using Beck's formula) $d_3$mfs increment was used to calculate relative risk (RR) and 95% confidence limits (CL) for the intervention, stratified according to tooth- and surface-position and presence of pre-cavitated or hypoplastic enamel.
Results: Examiner 'reversals' were noted for 10% of carious surfaces at baseline. Based on the adjusted caries increment, 9.1% (95% CL = 8.2, 10.0) of sound surfaces and 31.8% (95% CL = 26.6, 37.1) of pre-cavitated surfaces developed caries. Relative to the control group, RR in the intervention group was 0.76 for sound surfaces, 0.90 for pre-cavitated surfaces, and 1.02 for hypoplastic surfaces. Among sound surfaces, efficacy was greatest in maxillary anterior facial surfaces (RR = 0.69) and in posterior teeth (RR = 0.72).
Conclusions: The intervention had greatest efficacy on surfaces that were sound at baseline. Of those, maxillary anterior facial surfaces received most protection. Supported by: Project Grant #320858 from the Australian National Health and Medical Research Council.

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Oral Session O03/Anaesthesia

O03-19

Comparing the onset of local anaesthesia and pain experience using conventional technique *versus* the Wand in children

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Background: Previous studies on the onset of Local Anaesthesia (LA) and pain experience have been largely done on adults.
Aim: The study aims to compare the onset of LA and the pain experience of LA when administrating buccal infiltration using the conventional and the Wand techniques in children.
Design: Patients were randomly allocated to the Wand or the conventional group. The onset of pulpal anaesthesia was tested using an analytic electric pulp tester. Pain experience of LA was assessed using the Modified Visual Analogue Score (MVAS). SPSS was used for data analysis. Mann–Whitney Test was used for hypothesis testing.
Results: There were 15 subjects in each group and the age range was 8–16 years. The median time for the onset of LA was 6.30 min for the conventional and 7.25 min for the Wand. The mean pain experience using the MVAS score for the conventional was 9.78% as opposed to 8.46% in the Wand group. Hypothesis testing showed no statistically significant difference in onset ($P = 0.486$) or pain ($P = 0.713$) between the two groups.
Conclusions: This study showed no significant difference between the onset of LA and the pain experience in children receiving buccal infiltration when using The Wand and Conventional LA.

O03-20

Comparison of two computerized anaesthesia delivery systems; pain-related behaviour in children during two sequential dental visits

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Background: Dental local anaesthesia may create pain-free treatment, children's comfort and cooperation. However, the local anesthetic injection may also produce pain and anxiety. Moreover, often more than one treatment session is necessary to treat all caries. Consequently, the child needs to undergo several injections. When a painful stimulus is repeated over time different reaction-trends are possible.
Aim: The purpose of this study is to analyze the pain and distress response of children, receiving local anaesthesia with either the Sleeper One® or the WAND®, over two sequential treatment sessions, with disruptive behavior during local anaesthesia in the second session as dependent variable.
Design: This randomized crossover study was conducted among 100 children (mean age 5 years and 5 months, SD 9 months). All children needed two sequential dental visits using local anaesthesia. They were divided in four groups; for both visits each child was randomly assigned to either the use of the Wand® or the Sleeper One®.
Results: In the group of children who received anaesthesia with the Sleeper One® both the first and second treatment, the proportion of body movements was higher than in the other three groups (Kruskal–Wallis $P = 0.046$). For all other dependent variables no difference was found between the groups.
Conclusions: During two sequential dental visits no difference could be assessed between the two computerized systems. The presence of more disruptive body movements is only seen in the youngest age group possibly due to coping strategies.

O03-21

Development of a web-based preparatory information tool for children undergoing general anaesthesia for dental treatment

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Background: There is often little or no psychological preparation provided to children and their parents prior to attending General Anaesthesia (GA) for dental treatment. Anxiety can be minimized if families are given pre-operative supporting information.
Aim: To gather views of parents and GA service providers on the ingredients for designing web-based preparatory information tool for children having GA for dental treatment.
Design: Fifteen parents of children attending GA appointments for dental extractions at the Kings College Hospital Day Surgery Unit, five specialists in paediatric dentistry and five theatre staff were shown a short prototype cartoon with proof of concept established. One-to-one semi-structured interviews were conducted to explore ways in which the cartoon could be improved for use by families. Interviews were audio recorded and transcribed for analysis. Field notes were also made and analyzed. The data was content analysed.
Results: Both parents and professionals favored the idea of providing web-based preparatory information for children attending GA appointments for dental extractions. An interactive design, informative content and ease of use were reported as the important features needed for a new preparatory information tool. Parents were particularly interested in the incorporation of age-appropriate animation, child-friendly colour schemes, a clear but concise voice-over narration and information on prevention.
Conclusions: Both parents and GA service providers were very keen on having an appropriately designed web-based preparative package for children having GA for dental treatment.

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O03-22

Oral sedation in toddlers and preschoolers; a behavioural analysis

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Background: Dental treatment can be a stressful event. For toddlers and preschoolers oral sedation with midazolam is a treatment option to reduce this stress. Unfortunately not all children respond well to treatment with midazolam. Literature reports success rates between 50% and 75%. If the child's behavior during oral sedation could be predicted at an early stage of treatment, a different treatment strategy could be chosen.
Aim: To evaluate the child's sequential behaviour during treatment in a prospective analysis.
Design: Behaviour of 408 children during midazolam sedation was evaluated. Behaviour was scored using the Venham scale on four moments: midazolam intake, getting seated in the dental chair, application of local anaesthesia and the actual treatment. We investigated whether the behaviour of the child during a stage of the treatment session is predictive for the child's compliance during the consecutive part of the treatment.
Results: 38.2% of the children were very cooperative during treatment, while 33.1% of the children protested moderately. Restraint during dental treatment was needed for 28.5% of the children. A fair correlation of 0.581 ($P < 0.01$) was found between behaviour during midazolam intake and behaviour during dental treatment. Between drinking and receiving local anaesthesia a correlation of 0.637 ($P < 0.01$) was found. A strong correlation of 0.813 ($P < 0.01$) was found between receiving local anaesthesia and dental treatment.
Conclusion: Fair to strong correlations exist between the child's behaviour during consecutive parts of the midazolam supported dental treatment creating room to adapt treatment contents at an early stage.

O03-23

Conscious sedation by inhalation of 50% nitrous oxide and 50% oxygen

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Background: Conscious sedation by inhalation of 50% nitrous oxide and 50% oxygen is a method of pain and anxiety management in paediatric dentistry. It reduces pain and increase patient cooperation. Treatments are done in more favourable conditions which increase their quality.
Aim: The aim is to provide a review of this activity in the department of Paediatric Dentistry and Dental Care for Disabled Persons of the Saint-Luc Clinical University in Brussels.
Design: Data were collected during few years. Conscious sedation was obtained by inhalation of Kalinox® (Air Liquide Santé International, B5 170 bars). During session, we recorded informations concerning the general situation of the patient and the progress of the inhalation and the care (act performed, flow of the gas, time of inhalation, Venham index of behaviour).
Results and conclusions: The amelioration in the patient's comfort and its raising confidence in dental care create by this type of treatment help the young patient to more easily agree with them, and therefore to prevent important dental dilapidations. Treatment is carried out under more favourable conditions which increase its quality. It also allows practisioners to have a better clinical and radiological monitoring of disabled patients, and eventually help them maintain a good dental and periodontal health. The need for radical procedures and dental care under general anaesthesia is decreased.

O03-24

Influence of age and vertical facial morphology on the location of the mandibular foramen relative to the occlusal plane in growing patients

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Background: A successful nerve block anesthesia necessitates knowledge of the exact location of the mandibular foramen.
Aim: The aim of this study was to determine whether the distance between the mandibular foramen and the occlusal plane (vertical position of mandibular foramen) is different relatively to the age and to the vertical facial type.
Design: Lateral cephalometric radiographs from 141 Caucasians patients (average age 10.4 years; range 6.3–14.6) were collected. Pearson's correlation and linear regression were performed between vertical position of mandibular foramen, the age and variables on the facial vertical dimension.
Results: The vertical position of mandibular foramen was significantly correlated with all considered variables, especially with the age ($r = 0.692$, $P < 0.001$), with the inter-maxillary angle ($r = -0.575$, $P < 0.001$) and with the vertical facial proportion in soft tissue profile ($r = -0.764$, $P < 0.001$). Thus, in young and hyperdivergent patients, the position of the foramen is below or close to the occlusal plane. A multiple regression analysis model with the above-mentioned variables explained more than 70% of the variation of the vertical position of mandibular foramen.
Conclusions: These results suggest that taking into consideration the age and the facial morphology of the patient provides a good indication of the vertical position of mandibular foramen, and hence to have a better information where to insert the needle.

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Oral Session O04/Syndromes and Genetics

O04-25

Multi-disciplinary dental treatment in a child with Amelogenesis Imperfecta

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Introduction: Amelogenesis imperfecta is a developmental disturbance that interferes with normal enamel formation in the absence of a systemic disorder. In general it affects all or nearly all of the teeth in both the primary and permanent dentitions.
Case report: The present report describes a 9 year old boy diagnosed with Amelogenesis Imperfecta. The syndrome is manifested by numerous impacted teeth, missing teeth, and teeth undergoing intra-alveolus resorption. The four maxillary incisors were the only teeth present in his mouth. Secreting fistulae originating from the maxillary central incisors were diagnosed, exhibiting enlarged chronic periapical lesions on the radiographs. In addition, the four incisors were in a cross-bite position due to functional deviation. The mandibular arch presented with several malformed primary molars and with defective primary and permanent incisors. Dental treatment consisted of revascularization of one of the immature central incisors, conventional root canal treatment in the other central incisor, stainless steel crowns in the primary molars, and composite strip crowns in the anterior teeth. A removable partial denture was constructed to the maxillary arch in order to improve function, esthetics and occlusion.

O04-26

Complete microdontia in the primary and permanent dentitions

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Introduction: Microdontia describes teeth that are of normal form but are smaller in size than normal. Microdontia is more commonly associated with one or two teeth such as peg laterals or a group of teeth following some forms of chemotherapy. Generalized microdontia of the primary and permanent dentitions has rarely been reported in the literature and when reported there have usually been other conditions associated such as pituitary dwarfism.
Case report: This paper describes two brothers aged 6 and 4 years, who presented with complete microdontia of their primary and permanent dentitions detected clinically and on radiographs. Both boys were born after unremarkable pregnancies and neither have any significant medical anomalies. They have small stature with heights on the 10th percentile and weights on the 25th percentile. Paediatric examination has revealed no abnormalities. Clinically the teeth are very small with thin enamel which has a tendency to fracture. Radiographically the primary molars appear slightly taurodont with larger pulp chambers and all the permanent teeth appear microdontic.
Comments: The presentation will discuss possible diagnoses for the condition and compare the findings with previous reports.

O04-27

The impact of the dental manifestations of ectodermal dysplasia on affected children

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Background: Despite increasing evidence of the effects of dental conditions on quality of life (QoL), little work has been done to examine the impact of the dental manifestations of ectodermal dysplasia (ED) on Quality of Life (QoL) in childhood.
Aim: To investigate oral health related QoL of children with ED.
Design: A cross-sectional postal survey was carried out with families in the UK having at least one child aged 8–15 with oral or dental manifestations of ED. All children completed the Child Oral Health Impact Profile (COHIP) providing information about oral health, functional and socio-emotional well-being, school environment and self-image. Parents reported their perceptions of their child's general health.
Results: Completed questionnaires were returned by 35 families. The median COHIP score for the whole sample was 95.50 (IQR 68.75–108.25). Seventy-seven percent of boys reported a relatively high QoL score compared to only 23% of girls ($P = 0.017$). There was a strong association between global health and overall COHIP score (Spearman's $\rho = 0.677$, $P < 0.001$) adjusting for age and gender. There was a negative association between the overall COHIP and the parent's rating of the child's health (Spearman's $\rho = -0.419$, $P = 0.019$).
Conclusions: Results show that, even when young, children with oral manifestations of ED report negative effects on QoL in different domains. Symptoms of ED are also associated with negative parental reports of the child's health. These effects should be considered by clinicians providing oral health care for these children.

O04-28

Down syndrome children in Kelantan, Malaysia: dental attendance and mother's oral health knowledge

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Background: Down syndrome (DS) is the most common chromosomal anomaly in humans. DS children are prone to various types of dental problems. Caregivers are crucial in conveying oral health information to them.
Aim: To determine DS children's dental visit practices and its association with mother's educational level and to determine the association between oral health knowledge and source of dental information among mothers.

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Design: A cross sectional study was conducted in a randomly selected DS centers in Kelantan. A total of 110 mothers were given self administered questionnaire. The data were analyzed using SPSS version 18.0.
Results: Ninety-seven percent of mothers responded. The mean age of DS children were 11.15 (SD 6.17) and these of their mothers 48.31 (SD 8.74). Most children (62.6%) never visited a dentist, mean age of first dental visit was 7.2 (SD 3.51). Among those who visited, 69.2% did so when in pain. Mothers with low educational level were more prone to visiting dentist when in pain ($P = 0.017$). Majority of mothers (70.1%) received dental information from dentist, followed by television and radio (53.3%), magazines and newspapers (39.3%), as well as friends and relatives (16.8%). From all four sources, television and radio was found to be the main source of knowledge among mothers on the causes of bad breath ($P = 0.015$), prevention of dental caries ($P = 0.015$), role of fluoride ($P = 0.039$) and blood on toothbrush ($P = 0.032$).
Conclusions: Most mothers had good dental caries prevention knowledge; however, this knowledge was not translated into action as indicated by the unsatisfactory dental visits among DS children.

O04-29

Managing oligodontia in children and adolescents. The role of the multidisciplinary team

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Background: Oligodontia, both syndromic and non-syndromic, is characterized by the failure of development of multiple teeth germs, malformed teeth, reduced saliva secretion and abnormal jaw relations. The functional, aesthetic and psychological consequences are usually evident from early childhood.
Aim: To present the treatment protocol that is currently being applied for the interdisciplinary management at the Unit for Treatment of Children and Adolescents with Multiple Dental Agenesis in our dental school.
Design: The protocol aims to maintain systematic control during the management of oligodontia, in view of the complexity and longevity of the treatment. It is designed according to the main therapy targets: to cover the needs of each growth period and to establish optimum background for the final rehabilitation.
Results: The treatment corresponds to three successive stages. Introductory stage: the team establishes a trustful relationship with the patient and his/her family, deliberate on the immediate and tentative treatment plan and collaborate for the initial treatment interventions ending up to the construction of the first interim denture. Second stage: extends until the post-puberty period including coordinated prosthodontic, orthodontic and paedodontic interventions along with contributions by other specialties, when indicated. Final stage: begins with adulthood and includes the construction of the permanent prostheses, often combined with adjunctive orthodontic or surgical procedures.
Conclusions: For the children and adolescents with oligodontia, the treatment must be early planned and patient-centered. A well-structured protocol helps the multidisciplinary team to maintain clear objectives and holistic control through the consecutive stages of the long-term therapy.

O04-30

Oral rehabilitation with implant-supported overdenture in a child with Ectodermal dysplasia

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Introduction: Ectodermal Dysplasias (EDs) are a heterogeneous group of inherited disorders characterized by dysplasia of tissues of ectodermal origin (hair, nails, teeth, skins and glands) with conical shaped teeth and 'knife-edge' alveolar ridges.
Case report: An 11-years old boy affected by ED with anodontia came to our attention. Panoramic film and CBCT (Cone Beam Computerized Tomography) were performed and a resin model of mandibular bone of the patient was made. Since conventional prosthesis showed a reduced retention, two endosseous implants were placed under local anesthesia. Despite a remarkable multi-dimensional atrophy of the mandibular alveolar process, the insertion of two tapered screw implants (SAMO Smiler) was possible and resulted in safe primary stability. After a healing period of 2 months, the implants were exposed and abutment connection was performed. Implants were connected with an expansion bar which allows mandibular growth and prosthetic retention. An expanding removable prosthesis was then constructed. The amount of mandibular growth was followed and evaluated using the expansion guide and by cephalometric radiographs. The fixtures advanced with the mandible, maintaining their original relationship with the bone. The treated patient showed normal cephalometric measurement.
Comments: Early rehabilitation prevents the prognatism of the mandible. The expansion bar permits the growth of the mandible. The mandibular rotation accompanying growth did not caused a significant problem relative to the angulation of the implants and prosthodontic occlusal plane. Implants can be successfully placed and loaded in growing patients with EDs.

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Oral Session O05/Behavior Management 1

O05-31

The Scottish dental practitioner and their role in child abuse and neglect

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Background: Previous work by Cairns et al in 2005 showed that although 29% of dentists in Scotland had suspected child abuse only 8% had referred these cases on to the appropriate authorities. The phenomenon of under-reporting is an international problem.
Aim: To assess current knowledge of dentists in Scotland with regards to child abuse and neglect; whether the uptake and impact of child protection training had increased among GDPs; the willingness of GDPs to get involved in detecting neglect.
Design: A questionnaire was sent out to 50% of the GDP's in Scotland ($N = 1215$).
Results: Response rate was 52% (53% male). Thirty percent and 55% of respondents had received undergraduate or postgraduate training in child protection respectively. Thirty-eight percent had suspected child abuse/neglect in one or more of their paediatric patients but only 11% had referred a case. The most common factor that affected the decision to refer was 'lack of certainty of the diagnosis' (79%). Seventy-seven percent thought that children who were abused/neglected had more dental decay and 76% of dentists were willing to get involved in detecting neglect.
Conclusions: Dentists in Scotland are suspecting and referring more cases of child abuse/neglect than in 2005 although barriers to referral still exist. Most dentists believe that children who have been abused or neglected will have more dental decay. Seventy-six percent are willing to get involved in detecting neglect.

O05-32

Measuring dental fear using the CFSS-DS. Do children and parents agree?

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Background: The CFSS-DS is a well-known instrument for assessing dental fear in children and has been used in a large number of studies. Most studies use the version which is filled out by parents on behalf of their children. However, no information is available concerning the extent to which parents are able to report dental fear on behalf of their children. Therefore, the aim of this study was to assess whether parents are accurate reporters of child dental fear.
Design: The CFSS was handed out to 326 children (7–11 years old) and their parents (preferably mothers). The questionnaire was filled out by the children in a classroom setting and the parental version was filled out by the mothers at home on behalf of their child.
Results: The CFSS was filled out by 325 children and 167 (51.2%) parents. Mean CFSS of the children was 21.15 (SD = 6.4) and 23.26 (SD = 6.7) for the parents. The intraclass correlation coefficient was 0.566. After selection of the 73.1% most accurate reporting parents (<1 SD, six points, difference), the ICC was 0.90. In general, parents overestimate the dental fear of their children ($P < 0.001$). However, parents of high anxious children (HAC) underestimate the fear of their children ($P \leq 0.001$).
Conclusions: In general, parents tend to slightly overestimate the dental fear of their children. The majority of parents of low anxious children are well able to rate the level of dental fear of their children, while parents of HAC are not.

O05-33

Children's accounts of dental treatment under general anesthetic

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Background: Dental treatment is the most common reason for a child to undergo a general anesthetic in the UK. Little is known, however, about children's perspectives of this significant event.
Aim: The research sought to gain a deeper understanding of children's experiences of a dental general anesthetic (DGA).
Design: Children, aged 5–11 years, who were referred to a UK children's hospital for a DGA were invited to participate in this qualitative study. The research took a novel approach and centered around the use of video diaries. Children were asked to document their experiences and thoughts prior to, and following, their dental admission. They were provided with a video recorder and topic guide for suggested areas to film. The footage was supplemented by interviews, which were carried out with children in their homes, audio taped and transcribed verbatim. A thematic approach to analysis was taken.
Results: Children and their families proved enthusiastic participants and provided new insights into their experiences of a dental GA. A number of key areas were identified including: detailed accounts of the GA process itself, the supporting role of the family during the post-operative period and priorities for future oral health care. Our presentation will utilize excerpts from video diaries and interviews to demonstrate children's experiences of decision-making, coping and support mechanisms.
Conclusions: Findings from this study can be used to develop more appropriate patient outcome measures for use in clinical trials, and will inform service commissioners and providers on areas to improve quality of care.

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O05-34

Behavior management in paediatric dentistry – a video-analysis

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Background: Children represent a group of patients with diversity in age, cognitive and emotional development. Pediatric dentists are expected to adapt to each patient's individual needs to prevent dental behavior management problems, and to nurture a positive attitude towards oral health care. Dental behavior management guidelines are available, but their efficacy has been sparsely evaluated.
Aim: Aim of this study was to develop a protocol to evaluate the interaction between dentist and child based on video-recordings, and to identify techniques for efficient behavior management for the dental treatment of children.
Design: Dental maintenance visits of 69 children ranging from 8 to 17 years were video-recorded. To evaluate the interactions between dentist and patient methods from qualitative social research were adapted according to the step model of deductive category application (Mayring 2000).
Results: For all interactions documented as video-recordings recurring elements of the dental visit were identified and analyzed in consecutive stages from greeting of the patient to his dismissal. Within these stages interactions evolved, in which the communication between dentist and patient shifted in focus including building of confidence and transfer of information. Depending on the goal of interaction, behavior guidance techniques such as 'tell-show-do', 'positive reinforcement' or 'yes-set' were applied.
Conclusions: Competence in communication is part of the quality of professional health care, along with professionalism and technology. The protocol developed for this study is suitable to describe, analyze and evaluate communication behavior in dentistry. This approach can be utilized for the training of dental students and paediatric dentists.

O05-35

The occurrence of parafunction in adolescents with various degrees of dental anxiety

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Background: The occurrence and the increase in the intensity and frequency of harmful habitual movements of the masticatory organ (parafunction) in adolescents may often ensue as a reaction to stress or anxiety. Anxiety, which is an unpleasant emotional response frequently, prevents proper treatment of dental diseases.
Aim: Due to the above described factor, it seemed purposeful to determine a potential relationship between the occurrence of occlusal or non-occlusal parafunctions and the degree of dental anxiety in adolescents.
Design: The study involved 556 subjects (292 boys and 264 girls) attending secondary schools in Lublin. The average age of the subjects was 17.60 ± 0.89 years. This was a questionnaire survey using Corah's Dental Anxiety Scale-DAS was used as well as questions concerning the existing parafunctions. Clinical examinations were performed. The obtained results were statistically analyzed using χ^2 and Mann–Whitney test.
Results: The performed analysis showed that 81.29% of the subjects had parafunctions. The most frequent ones were lips biting (55.76%), foreign objects biting (55.58%) and bruxism (21.58%).The mean DAS value was 9.47 ± 3.56 points. According to the study results, there is a statistically significant relationship between the level of dental anxiety and such parafunctions as bruxism, upper lip biting and foreign objects biting in adolescents. Among subjects with the above mentioned parafunctions the mean DAS value was significantly higher than in the group of subjects not exhibiting any parafunctions ($P < 0.05$).
Conclusions: The obtained study results suggest the following conclusion: there is a relationship between DAS and the occurrence of particular parafunctions.

O05-36

Child protection procedures in Greece: record of child abuse

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Background: Child protection services in Greece play an increasingly important role in recognizing and reporting cases of child abuse, as well as sheltering the young victims that get abused. Child abuse is a constantly increasing phenomenon and these services have an active part in our concurrent societies due to that.
Aim: The aim of this study is to present the framework of operation and the current statistics provided by social services in the Greek region regarding child abuse reports.
Design: The study consists of the statistics as provided by the child protection services that provide established support in victims of abuse. The services provided are compared to the ones at other countries in order to assess the Greek level of social solidarity provided.
Results: The results of the study show a constant increase of child abuse victims in the period of 2005–2009. In addition, more cases of child abuse are reported per year. Most cases involve physical abuse and child neglect. The abusers are almost always one of their parents or both of them.
Conclusion: Child abuse is an existing reality in Greece, and even the active role of the plethora of social services, there is the need for more action to be taken. The first step is the proper enlightment of physicians, dentists and especially pediatric ones in the significance of the early recognition of signs of child abuse and the appropriate report to the authorities.

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O05-37

Dental anxiety in adults with attention deficit hyperactivity disorder

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Background: Attention Deficit Hyperactivity Disorder (ADHD) is a common developmental disorder. The prevalence of ADHD has been estimated to be about 2–3% in adults. We have previously shown an increased level of dental anxiety among children with ADHD.
Aim: The aim of the study was to test the hypothesis that adults with ADHD exhibit more dental anxiety compared to a control group.
Design: Twenty-one adults with ADHD aged 22–47 year and a control group of 69 adults matched by age and sex, completed two psychometric scales on dental fear, Corah Dental Anxiety Scale (CDAS) and Dental Beliefs Scale (DBS-R) and a questionnaire on previous dental experience, during a dental examination.
Results: The mean sum of score of the CDAS was 10.9 ± 5.5 in adults with ADHD compared to 6.9 ± 2.8 in the control group ($P < 0.001$). The mean sum of score of the DBS-R was 55.6 ± 31.6 in adults with ADHD compared to 34.2 ± 10.7 in the control group ($P < 0.001$). Seventy-six percent of the adults in the ADHD group had experienced that the dental local anesthesia was insufficient, compared to 48% in the control group ($P = 0.026$). Thirty-eight percent of the adults with ADHD felt that they had been forced to dental treatment they were not prepared for, compared to 13% in the control group ($P = 0.012$).
Conclusions: Adults with ADHD exhibit more dental anxiety and feel that they have had more negative dental experience compared to a control group.

O05-38

Paediatric dental patients' attitudes to rubber dam

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Aim: To explore young patients' experiences of rubber dam (RD) and determine how personal and clinical factors may influence opinions.
Methods: An anonymous questionnaire was developed to capture paediatric patients' experiences of treatment under RD in a hospital setting. The following clinical variables were also recorded: type of RD; procedure undertaken; use of local anaesthetic and procedure duration. Patients' acceptance of RD and perceptions of how well it was explained to them were recorded on a 10 cm Visual Analogue Scale (VAS), where zero represented the most negative score.
Results: One hundred children (52 male, 48 female) with a mean age of 11.8 years (range 7–17 years) participated. Overall, acceptance of RD was satisfactory (mean VAS = 5.0). Patients were happy with the explanation of why RD was used (mean VAS = 7.7). The type of RD, use of local anaesthetic, procedure undertaken and duration of the procedure did not significantly influence acceptance levels. However, RD was significantly less acceptable to patients who underwent radiographic examination whilst wearing the RD ($P < 0.05$, t-test). Almost twice as many patients expressed concern at being seen wearing RD when taken to the radiology department (39.2%, $n = 20/51$), compared to those who were reportedly self-conscious about RD while only on the paediatric dentistry clinic (21%, $n = 21/100$).
Conclusions: The use of RD appears acceptable physically and psychologically to most paediatric patients; however, visibility of the RD was of potential concern.

O05-39

Suitability of articaine with reduced epinephrine content for local anesthesia in routine dental treatment for children

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Aim: Articaine hydrochloride with added epinephrine is a well-suited medicinal product for local anesthesia in children. However, the generally long-lasting anesthetic effect frequently promotes bite lesions. In the course of the present investigation it should be clarified whether a reduced epinephrine concentration may lead to comparable results in anesthetic efficacy and has an impact on the duration of soft tissue anaesthesia.
Design: One dental school for Pediatric Dentistry were involved in multi-center study, 37 patients received documented treatment (mean age 9.5 (5–15) years; 20 male, 17 female) of two operators. Local anesthesia was performed using Ubistesin 1/400 000 for infiltration, block, and intraligamentary injections. The questionnaire involved the parameter "region", "indication", "kind of anesthesia", "additional injections", "efficacy", "duration of treatment", and "duration of effect".
Results: Mean time span between injection and treatment were 12 min, to the end of treatment 31 min. Patients reported 2.5 h of anesthetic effect mean time span. Anesthetic effects were sufficient or complete for conducted measures (cavity preparation $n = 19$, extraction of primary teeth = 18). In four cases, an additional injection was required. The amount of the anesthetic had no influence on the duration of the effect (Pearson Correlation).
Conclusion: The epinephrine-reduced Ubistesin 1/400 000 seems to be suitable for simple therapeutic measures in Pediatric Dentistry. A sufficient anaesthetic effect during dental treatment has been achieved.

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Oral Session O06/Cariology 2

O06-40

Consequences of severe early childhood caries on permanent teeth

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Background: Severe early childhood caries (S-ECC) may have consequences on permanent dentition such as higher risk of caries and eruption disturbances.
Aim: To analyze caries experience and eruption pattern in permanent dentition in children with S-ECC treated and followed-up in our department.
Design: A case-control study was conducted upon two groups of children aged 6–12 years: (i) study group: 76 children, mean age 8 year 1 month ± 1 year 7 month, with S-ECC; (ii) control group: 76 children, mean age 8 year 2 month ± 1 year 6 month, without S-ECC, with past caries experience only on primary molars. DMFT/S indexes were calculated and the sequences of eruption and position of permanent incisors were registered. Data was analyzed using chi-square, Mann–Whitney and Kruskal–Wallis tests.
Results: (i) Forty-nine children (64.47%) of the study group developed caries in permanent teeth *versus* 29 (38.16%) of the control group. Mean DMFT/S indexes were 2.18/2.99 for the study group and 0.97/1.25 for controls (SS, $P < 0.001$). 44.74% of the first permanent molars in the study group had caries compared to 23.68% in the control group. The percentage of sealed first permanent molars was 30% higher in the control group. (ii) Eruption disturbances: reversed eruption sequence of central incisors (11 children) and malposition of one or more incisors (eight children), most of them with nonskeletal anterior crossbite in the study group.
Conclusions: (i) Caries experience in permanent teeth was significantly higher in the study group; eruption disturbances occurred only in children with S-ECC. (ii) Frequent follow-up visits during the mixed dentition are necessary to minimize the consequences of S-ECC on permanent teeth.

O06-41

Occlusal caries diagnosis in primary molars: an *in vitro* and *in vivo* study

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Background: Many methods of caries diagnosis in children have been tested *in vitro*, but not *in vivo*.
Aim: To evaluate the *in vivo* and *in vitro* effectiveness of ICDAS II (International Caries Detection and Assessment System) visual inspection compared to CarieScan PRO™ (an alternating current impedance spectroscopy device) for the detection of occlusal caries in primary teeth.
Design: Thirty-eight molars from 21 patients were evaluated under *in vivo* standardized conditions by one operator. The teeth were then extracted, along with an additional 38 molars from 17 patients. A total of 76 molars from 38 patients were used for *in vitro* evaluation, carried out by the first and second operator. Histological examination using the Downer scoring system was the validation gold standard.
Results: For ICDAS II *in vivo*, the mean sensitivity was 0.89 and specificity was 0.72. For CarieScan PRO it was 0.80 and 0.40 respectively. For *in vitro* ICDAS II results, mean sensitivity between examiners was 0.87 and specificity was 0.76. For CarieScan PRO it was 0.59 and 0.79 respectively. *In vitro* Inter-examiner reproducibility (Cohen's kappa) ranged from 0.828 to 0.95 for ICDAS II, and 0.22 to 0.51 for CarieScan PRO. *In vitro* to *in vivo* reproducibility ranged from 0.57 to 0.79 for ICDAS II, and no result could be drawn for CarieScan PRO.
Conclusions: Use of the ICDAS II criteria was an accurate method of occlusal caries diagnosis when applied to primary teeth *in vivo*. *In vitro* CarieScan results were poor and did not relate to the *in vivo* findings.

O06-42

Effect of daily intake of probiotic bacteria on recolonisation of mutans streptococci after chlorhexidine suppression

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Background: The overgrowth of acid-tolerating species such as mutans streptococci (MS) is associated with caries. Various antibacterial strategies have therefore been suggested in the medical approach of preventing and combating caries and the use of chlorhexidine is probably the most validated. However, a recolonisation of MS usually takes place quickly which may hamper the expected anti-caries effect.
Aim: The aim of the project was to evaluate whether daily use of lozenges containing probiotic bacteria could inhibit or delay the recolonisation of salivary mutans streptococci in the oral cavity after a full-mouth disinfection with chlorhexdine.
Design: The multi-centre, prospective study had a randomized, placebo-controlled double-blind design with two parallel arms. Sixty-two healthy young adults with high counts of salivary MS were enrolled. After a full-mouth disinfection with a combination of chlorhexidine rinses and varnish they were given lozenges with two strains of *L. reuteri* or placebo. The duration of the intervention was 6 weeks and follow-up saliva samples were collected immediately after disinfection (baseline) and after 1, 6, 12 weeks.
Results: A statistical significant reduction of mutans streptococci after full-mouth disinfection with chlorhexidine was seen at 1 and 6 weeks after treatment in both groups. However, no statistical significance was seen between the test and placebo groups.
Conclusions: Lozenges containing probiotic bacteria did not seem to affect recolonisation of mutans streptococci after suppression with chlorhexidine.

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O06-43

The effect of ozone gas on initial caries lesions *in vitro*

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Background: White spot enamel lesions are commonly treated with fluoride.
Aim: To investigate if the application of ozone gas enhances a remineralising effect on initial enamel lesions.
Design: Sixty enamel-specimens were cut from surgically removed human third molars. The specimens were transferred to a *S. mutans*-culture, which was renewed daily, to create initial caries-like lesions (130 μm). After 15 days the specimens were stored in artificial saliva (remineralisation) for 16 h each day and then for 8 h in the bacterial culture for demineralisation. Then the specimens were divided into four groups: (I) Samples were fluoridated twice daily with 0.15% NaF and treated with Elmex fluid (10 000 ppm fluoride) every 2 weeks, (II) ozone gas (Heal Ozone) was applied to the samples every 2 weeks, (III) samples were twice daily treated with 0.15% NaF and ozone-treated, (IV) a control group. These procedures including the daily change of de- and remineralising phases were continued for 4 weeks. Then, thin sections were prepared, and the demineralisation depths were measured using polarization microscopy.
Results: The demineralisation area was in both ozone treated groups (II: 69.5 ± 24.8 μm; III: 63.7 ± 20.9 μm) significantly smaller than in the fluoride treated (171.5 ± 37.6 μm) or the control group (184.2 ± 57.4 μm, $P < 0.001$; *U*-tests). No other significant differences were observed.
Conclusions: Under the given experimental conditions, with regularly changing de- and remineralising phases, the application of fluoride does not enhance the remineralisation of artificial white spot lesions, while the additional application of ozone gas has a significant remineralisation enhancing effect.

O06-44

Are we complying with RCS (ENG) guidelines on the extraction of first permanent molars with poor prognosis?

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Background: Caries and hypoplasia in the first permanent molars (FPM) is a relatively common phenomenon and is partly due to their early development and eruption as part of the adult dentition. If the FPM has a doubtful prognosis then consideration should be given to their extraction at the correct chronological and developmental stage. In 2009, The Royal College of Surgeons of England (RCS Eng) has published updated guidelines to assist with treatment planning of such cases.
Aim: To assess compliance with the RCS (Eng) guidelines on treatment planning for the extraction of FPM in the Paediatric Dental Department at Birmingham Dental Hospital.
Design: Fifty sets of notes were randomly selected using computer software. The quality of record keeping was assessed using a data collection form.
Results: Seventy-nine percent of referrals came from the GDP. Fifty-one percent of patients were first assessed later than the guidelines recommend, mainly due to delays in initial referral. Patients that were referred at the ideal time had extractions carried out appropriately. Thirty-eight percent of patients had four, 6% had three, 36% had two and 19% had one FPM extracted. Information relating to the patient's occlusion was not recorded for 17%, partially recorded for 81% and completely recorded for 2% of patients. Fifty-two percent of patients were assessed by an orthodontist. All patients had radiographs prior to extractions.
Conclusion: We are complying with RCS (Eng) guidelines in the timing of extraction of first permanent molars but better record keeping is required in the area of orthodontic assessment.

O06-45

The additional diagnostic yield of bitewing radiographs compared with meticulous visual examination alone

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Background: Caries detection and diagnosis remains a key issue.
Aim: This *in- vitro* study's aim was to compare the validity and reproducibility of meticulous visual examination using the ICDAS II criteria, with and without bitewing radiographs for the diagnosis of approximal and occlusal caries in primary molar teeth.
Design: One hundred and twelve extracted primary molar teeth (collected with written consent) were set-up in groups of 4, in pink impression putty, to mimic their anatomical positions. Three trained examiners independently examined these teeth. The teeth were examined in dental surgery conditions, using the ICDAS II criteria. Simulated bitewing radiographs were taken of each block (F-speed film, Kodak, UK). Each film was examined in a darkened room on a blacked-out light box with magnification (×5). All examinations were conducted blind and repeated after a break of at least 24 h. Subsequently, the teeth were serially sectioned for histological validation by two examiners.
Results: All results are at the D_3 (dentine caries) threshold. For the visual examination alone the sensitivity and specificity were, 58.3 and 94.2 for the approximal surfaces and 63.1 and 92.8 for the occlusal surfaces, respectively. The addition of the information from the bitewing examinations produced values of 55.8 and 96.0 for approximal surfaces and 68.7 and 97.3 for occlusal surfaces. The intra-examiner reproducibility (κ) overall was 0.77 for the MVE and 0.75 for the radiographic examination.
Conclusion: The addition of the information from a radiographic examination to a meticulous visual examination increases the specificity of the examination.

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O06-46

Prevention of occlusal caries at children up to 3 year

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Background: Occlusal caries prevails during childhood. Its treatment may be a difficult problem because of behavioral peculiarities of little children along with certain limitations of general anaesthesia application. Thus more attention must be paid to early prevention of occlusal caries.
Aim: To search into the effectiveness of different preventive methods concerning occlusal caries at children up to 3 years.
Design: Fifty randomly selected children with caries-free molars aged up to 3 year were included to the research. Four different preventive methods where performed for different molars in each child (302 teeth in all): application of fluoride varnish (Bifluoride 12, VOCO), sealing of fissures with glass ionomer cement (GIC) (Molar Easymix, 3M ESPE) and composite sealant (Fissurit, VOCO). The results where compared with molars without any prevention except toothbrushing. The effectiveness of prevention was evaluated by calibrated examiners at 3, 6, 12, 24 and 36 months.
Results: After 1, 2 and 3 years the survival rate of composite sealants was respectively 87.5%, 75%, and 62.5%; GIC-72.22%, 56.94%, and 45.83%. Caries increment in teeth after sealing with composite sealant in 1, 2 and 3 years was 0%, 12.5%, and 18.75% respectively, after sealing with GIC- 4.17%, 12.5%, and 23.62%, respectively, after application of fluoride varnish-10.00%, 30.00%, and 46.67% respectively.
Conclusion: Composite sealants demonstrated the highest preventive effectiveness, although glass ionomer sealants are considered as a more available method of molar caries prevention in young children due to their effectiveness and easiness in use.

O06-47

Reasons for extraction of tooth in 3–8 year-old children

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Background: Extraction of primary or permanent teeth is performed for several reasons, including caries, periodontal disease, orthodontic treatment, traumatic injures, treatment failure, tooth impaction or eruption.
Aim: The purpose of this study was to investigate the principal reasons for extraction in children aged between 3 and 8 years.
Methods: The patients selected randomly for this retrospective study were identified by analyzing dental records of 3–8 year-old children receiving dental treatment. A total of 825 panoramic radiographs have been viewed. The patient's age and gender, df, dfs, DMF, DMFS, number of extracted teeth and the reasons for the extraction were recorded. The data were converted to SPSS format, frequency and *T* test was used for analysis.
Results: One thousand four hundred and eight (12 permanent, 1396 primary) extractions were performed in 825 (362F, 463M) of the patients. Patient's mean ages 6.5. Reasons for extractions were; caries: 72.6%, orthodontics: 0.2%, trauma: 5.9%, periodontal: 0.4%, eruption: 3.6%, treatment failure: 1.7%, other reasons: 4.04%. The mean df, dfs, DMF, DMFS scores were found respectively 5.4, 9.4, 0.5, 0.6. Statistically significant differences were found only between caries related extraction and df, dfs, DMF and DMFS.
Conclusions: This study supports that caries was the main reason for extraction in children.

O06-48

Pain perception during micro-invasive treatment of non-cavitated proximal carious lesions in children

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Aim: The aim of this study was to evaluate the pain perception during micro-invasive treatment proximal carious lesions in children.
Design: Thirty-four children, 7–11 years-old, presenting at least one primary molar with non-cavitated proximal carious lesion were selected for the study. Approval by the committee for ethics in research and informed consent were obtained. The faces pain scale [Wong & Baker, 1988] ranging from 1 (no pain) to 6 (very strong pain) was used to assess pain in two moments: after the placement of rubber dam (M1); and after the placement of the wedge for tooth separation (M2). Lidocaine 2% was used for gingival anesthesia before placing the clamp. An experienced clinician in pediatric dentistry performed the micro-invasive treatments with Icon (DMG, Hamburg, Germany) and pain was assessed by a trained assistant. Chi-square test was used to compare variables.
Results: At both M1 and M2, the majority of children (67.6% and 52.9%) reported no pain or very slight pain. Slight or moderate pain was reported by 32.3% of the children at M1 and 41.2% at M2. Two children (5.9%) reported very strong pain at M2. No significant difference was observed between M1 and M2 ($P > 0.05$). Pain perception at M2 was not influenced by the type of tooth (upper or lower) ($P > 0.05$) neither by the position of the wedge (between two primary molars or between a primary and a permanent molar) ($P > 0.05$).
Conclusions: Micro-invasive treatment of non-cavitated proximal carious lesions was well tolerated by children, being therefore a feasible technique to be used in pediatric dentistry.

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Oral Session O07/Prevention 1

O07-49

Microleakage assessment of fissure sealant following preparation with a bur or pumice prophylaxis before etching

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Background: Pit and fissure sealants have been found to prevent occlusal caries.
Aim: The aim of this investigation was to compare the microleakage level of fissure sealants after preparation of the fissure with a bur or pumice prophylaxis prior to acid etching.
Design: Ninety freshly extracted healthy maxillary premolar teeth were randomly selected for this investigation. Teeth were then divided into three fissure sealant preparatory groups of A: bur preparation + acid etch; B: pumice prophylaxis + acid etch and C: acid etch alone. Sealant was applied to the occlusal fissures of all specimens using an explorer. This was to avoid any air trap under the sealant. Sample teeth were first thermocycled (1000 cycles, 20 s dwell time) and then coated with two layers of nail varnish leaving 2 mm around the sealant. This was then followed by immersion in Basic Fuchsin 3%. Processed teeth were sectioned longitudinally and examined under a stereomicroscope for microleakage assessment using a score of 0–3.Collected data was then subjected to Kruskall–Wallis and Mann–Whitney tests.
Results: Teeth treated with a bur and pumice prophylaxis had significantly reduced level of microleakage than those in acid etch alone ($P = 0.005$ and $P = 0.003$, respectively).
Conclusions: Preparation of the fissures with a bur and pumice prophylaxis accompanied with acid etching appears to have a more successful reduction of microleakage than acid etch alone.

O07-50

Oral health behaviour and dental attendance outcomes of a cluster randomized dental prevention trial

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Background: Dental caries in indigenous children in industrialized countries continues to be a public health concern.
Aim: This cluster randomized trial in Quebec, Canada tested the effectiveness of a counseling approach, Motivational Interviewing (MI), to control caries in young Cree children. Outcomes related to oral care behaviours and dental attendance will be presented.
Design: Mothers in the five test communities had the MI intervention during pregnancy and at well-baby visits. Control mothers from the remaining four communities received pamphlets. Data on children's dental health status and family dental health practices was collected when children were ≥30 months of age.
Results: A number of 272 (131 test; 141 control) mothers were recruited over 2½ years. Baseline dental behaviour characteristics were similar for both groups. At trial's end, 241/272 (88.6%) of participants had follow-up. MI did not appear to significantly affect test mothers' oral health behaviours. However, their selection of snacks for their child was more 'dentally-healthy' and a lower proportion of test children slept with a bottle. A greater proportion of control (28.2%) than test (19.4%) parents said dental pain had affected their child adversely; a larger percentage of control (17.5%) than test (11.7%) parents reported their child visiting a dentist for tooth pain. Of test children, 40% had caries at the dentin level or deeper compared to 65% of controls.
Conclusions: Overall, the results do not provide compelling evidence for a positive effect of MI on dental health behaviours of Cree parents. However, the intervention may have an impact on the severity of disease. Trial supported by CIHR RCT Grant FRN 67817.

O07-51

Tooth brushing of adolescents in schools: a 4-months cohort study

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Background: In many countries, a decline in caries prevalence has been achieved through tooth brushing with fluoride toothpaste. However, tooth brushing requires patient motivation and collaboration. Schools are considered to be an ideal environment for health promotion programs.
Aim: To investigate the effectiveness of tooth brushing for adolescents in a school environment.
Design: At baseline, 123 randomly selected 13–14-year-old adolescents (74% response rate) participated in the study, and 108 were re-examined after 4 months (87.8% follow up). From these, 38 students were randomly selected for the test group, while 70 students made up the control group. The acquired data was checked for normal distribution by the Kolmogorov–Smirnov test. To compare the data, a *t* testor Mann–Whitney *U* test were used ($P < 0.05$).
Results: There were no statistically significant differences in gender, age and initial caries experience between the test and the control group. In 4 months the DMFT index increased from 6.92 to 7.42, but the Silness-Löe index decreased from 2.0 to 1.5. There were statistically significant differences (control *versus* test group) in DMFT increment score (0.76 *vs* 0.55, $P = 0.003$), in the decrease of Silness-Löe index score (−0.37 *vs*−0.78, $P = 0.001$) and tooth brushing frequency ($P = 0.007$). Students from the test group attended a dental hygienist ($P = 0.011$) and dentist ($P = 0.005$) more frequently.
Conclusions: Provision of tooth brushing once per day in the school environment resulted in significant improvement of oral hygiene and slower progression of caries in adolescents. Additional tooth brushing at school provided motivation for a more frequent brushing at home and to attend dentists and dental hygienists more frequently.

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O07-52

The role of different fluoridated dentifrice formulations in enamel remineralisation *in vitro*

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Aim: The aim of this study is to investigate the effect of commercially available dentifrices with different fluoride formula on remineralisation of enamel surface.
Design: Enamel blocks were ground flat with water-cooled carborundum discs (320, 600 and 1200 grit) and randomly divided into seven groups. Specimens were subjected to a daily cycling regime comprising: two 1-min treatments; one before and one after the demineralisation period of 6 and 18 h remineralisation in artificial saliva. During the pH cycling regimen each of the those seven groups were received different treatment: fluoride dentifrice Sensodyne Rapid (1040 ppm NaF), Colgate Total (1100 ppm NaF), Parodontax fluoride (1400 ppm NaF), Sensodyne fluoride (1400 ppm NaF), Pronamel Sensodyne (1450 ppm NaF), Elmex-GABA International (1250 ppm F Amine fluoride) and fluoride free Detartrine Paste (Septodont). The surface microhardness (SMH) of the specimens was determined at baseline and after 12 days using HMV-2000 (50 g, 490.3 mN, 10 s) (Shimadzu, Japan).
Results: All specimens groups treated with fluorides showed increase in SMH compared to control group. Pronamel, Sensodyne F and Sensodyne Rapid were statistically superior to other fluoride dentifrices and a fluoride-free control after 12 days pH-cycling regime. Rates of enamel microhardness at baseline and after 12 days cycling treated with Parodontax obtained increase in SMH, but it was not statistically significant ($P > 0.05$).
Conclusion: The results obtained in the present study showed that high fluoride toothpastes (1450 ppm) effectively inhibit demineralization under experimental conditions.

O07-53

Protective effect of casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) in dental enamel erosion by soft drinks

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Background: Enamel erosion can be often caused by frequent consumption of soft-drinks.
Aim: Aim of this *in vitro* study was to determine: (i) the erosive potential of a soft-drink on dental enamel; (ii) the effectiveness of a synthetic CPP-ACP preparation in reducing enamel erosion caused by a soft-drink.
Design: Extracted sound human permanent molars were utilized and divided in four groups (A;B;C;D). The roots were cut and the crowns were sectioned to give three enamel slices from each tooth. One slice from each tooth was immersed in: (i) a soft drink; (ii) a soft drink and synthetic CPP-ACP; (iii) deionised water, respectively for 40, 20, 10, 5 h, according to the belonging group (A;B;C;D). pH measurements were undertaken at the start and the end of each immersion cycle and statistically analyzed with ANOVA. Enamel surfaces were examined with SEM.
Results: Enamel slices immersed in the soft drink exhibited microscopic surface irregularities, worsening with the increase of the exposure time. The addition of synthetic CPP-ACP markedly reduced the extent of erosive destruction. Adding CPP-ACP to the soft drink did not influence significantly the pH of the solutions.
Conclusions: The findings demonstrated the effectiveness of synthetic CPP-ACP in providing protection of enamel against erosion. This capability was not due to the CPP-ACP buffering capacity, but, actually, acidic environment caused a release of calcium and phosphate ions from CPP-ACP complexes in solution, which were necessary to limit enamel erosive process and promote enamel remineralisation.

O07-54

The reduction of demineralisation by decreasingly shorter chain statherin like peptides

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Background: The salivary protein statherin (StN43) is actively involved in biomineralisation processes within the oral environment. Statherin and its shortened analogues containing only the N-terminal 21 amino acids (StN21) have been shown to significantly protect against cariogenic challenges *in vitro*.
Aim: To identify the functional domain of statherin required for its cariostatic function by measuring the efficacy of decreasingly shorter length peptides containing only the N-terminal 21, 15, 10 and 5 amino acid residues in reducing the rate of mineral loss using scanning microradiography (SMR).
Design: Hydroxyapatite (HAp) pellets (20% porosity) were used as enamel analogues. A single surface of each of 10 HAp pellets was exposed to 0.1 M acetic acid at pH = 4 for 120 h. The pellets were rinsed and coated with StN21, StN15 StN10 or StN5 peptides for 24 h. Controls were HAp pellets coated with phosphate buffer only. The coated pellets were then further demineralised for 120 h. The rate of HAp dissolution (RD_{HAp}) before and after coating was measured using SMR at 20 points in each HAp pellet.
Results: Coating with StN21 demonstrated a 40% reduction and StN15 a 35% reduction in RD_{HAp}. StN10, StN5 and buffer only coatings showed no cariostatic efficacy.
Conclusion: Statherin-like peptides of >10 amino acids are required for cariostatic function, probably related to the binding of these peptides with HAp. Application of StN15 onto incipient enamel lesions can prevent their progression to established decay in caries active and high caries-risk children.

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O07-55

Water fluoridation in Greece

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Background: A number of countries have naturally occurring fluoride in their water, while others add it at water-processing plants. Three hundred and fifty-five million people worldwide receive artificially fluoridated water. At least 50 million people worldwide drink water naturally fluoridated to optimal levels.
Aim: To evaluate the variation in fluoride (F) levels of tap waters over periods of up to 1 year in Greece.
Design: Tap water samples were collected from 44 areas in 20 Prefectures of Greece (no water fluoridation) from 48 residencies and/or public areas monthly for up to 1 year. They were analysed in triplicate for F concentration using ion chromatography.
Results: The mean (yearly) F content detected in all the locations were <0.1 ppm, except for three areas (Miloi, Lechaio and Galatas) which had mean F levels of 0.1 ppm. There were locations where the mean (monthly) F content was >0.1 ppm but <0.3 ppm (Tabouria, Galatas, Argos, Miloi, West Veria, Depot, Kalamaria, Ano Toumba, Polichni, Heraklio, Korinthos, Krokos, Kozani, Patra and Rio Hospital). In one area the mean (monthly) F content was found to be 0.68 ppm (Kastoria).Among all the locations included, the F content ranged from negligible amounts (<0.01 ppm) in Tripoli to 0.68 ppm in Kastoria city centre.
Conclusions: This was the first study conducted at a national or European level for the evaluation of F in tap waters over a period of 1 year. F fluctuations among locations with the same water supply origin were observed. Different F levels for the same time periods were observed between areas within the same Prefecture.

O07-56

Effect of a new NaF toothpaste on enamel remineralization of artificial caries-like lesion

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Background: The fluoride-containing toothpaste constitutes an important method for the prevention and or remineralization of early dental decay.
Aim: The purpose of this study was to evaluate the effect of new fluoride-containing dentifrice on *in vitro* enamel surface microhardness (SMH) under a pH-cycling regimen.
Design: Thirty five sound human enamel samples were distributed among five groups (A–E) each having seven samples as Sensodyne Pronamel for Children (A) (1450 ppm NaF), Sensodyne Mint(B) (fluoride-free placebo), Signal White (C) (145 0 ppm Sodium-Monofluorophosphate), Ipana7(D) (1450 ppm NaF), Colgate For Kids (E) (1000 ppm NaF). After inducing caries-like lesions, each group was maintained daily de-and remineralization cycle period for 7 days. During cycle, samples were treated by the selected toothpaste for each groups. Enamel mineral loss was assessed by surface microhardness. Lesion depths and the depth of the remineralized band were quantified using polarized light microscopy (PLM). Surface enamel microhardness was determined on the enamel blocks before, after demineralization and after the pH-cycling regimen. Surface microhardness recovery (%SMHR) among treatments was analyzed by two way ANOVA.
Results: The mean surface microhardness was 15.91 (SD 13.37) for A, 8.76 (SD 7.54) for B, 8.92 (SD 6.72) for C 12.94 (SD 5.54) for D and 11.67 (SD 6.43) for E. The highest values of SMH were observed for the group A. PLM data revealed a significantly thicker mineral precipitation band on the surface layer of the group A treated lesions when compared to the other groups ($P > 0.05$).
Conclusions: The results suggest that toothpastes with similar concentrations of fluoride, provide different levels of remineralization. It can be concluded that Sensodyne Pronamel for Children enhances remineralization of caries like enamel lesions compared to the other test toothpastes.

O07-57

Oral health and health consciousness of the pregnant women: a pilot study

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Background: Early childhood caries remains one of the most common chronic diseases of early childhood. The primary prevention measures directed to pregnant women are supposed to maintain dental health of their own and their infant.
Aim: To assess the oral health of pregnant women and to evaluate necessity of additional information on the infant tooth care and the feeding.
Design: In this pilot study 35 pregnant women volunteered to be examined using DMF, CPITN, Silness & Loe index. Saliva samples were taken to assess level of *Streptococcus mutans* and Lactobacillus spp. Women were asked to complete a questionnaire about their tooth brushing habits and knowledge about infant oral care and feeding. The data were checked for normal distribution by the Kolmogorov–Smirnov test. To compare Descriptive statistics and a one-way ANOVA for comparison of the acquired data were used ($P < 0.05$).
Results: The average (SD; Min, Max) age was 30.03 (4.33; 22.39). The average (SD) DMFT index was 11.6 (4.67), and CPITN showed only 0.17 as the average healthy sextants. 68.6% of respondents found the information about infant care new for them. There were observed statistically significant differences between tooth brushing frequency and DMF_s ($P = 0.023$), Silness & Loe index ($P = 0.001$) and *Lactobacillus* spp. ($P = 0.031$). *Streptococcus mutans* $>10^5$ were found 25.7% and *Lactobacillus* spp. – 31.4% of women.
Conclusions: Pregnant women have poor oral health. There is an association between oral hygiene and dental health. It is necessary to provide additional information to the mothers about their own dental care and their infant'oral health as well as feeding habits.

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Oral Session O08/Oral Pathology 1-Oral Surgery

O08-58

Benign fibro-osseous lesions affecting the jaws in childhood. A 10 years experience

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Background: A diverse group of disorders including developmental lesions, reactive or dysplastic diseases and neoplasms have been described as 'benign fibro-osseous lesions'. They frequently develop in the jaws and share overlapping clinical, radiographic and histopathologic features. They also demonstrate a wide range of biologic behavior that leads to individualized therapeutic management.
Aim: To evaluate the characteristics and treatment of benign fibro-osseous lesions of the jaws in paediatric patients.
Design: Data from 23 patients (14 males and nine females with a mean age of 8.5 years) treated in our department from January 2001 to December 2010, were registered in this study. All cases were surgically treated and histopathologically confirmed.
Results: Fourteen cases were true fibro-osseous lesions (seven fibrous dysplasias, one McCune-Albright syndrome, one juvenile aggressive ossifying fibroma, one cemento-osseous dysplasia, three unclassifiable fibro-osseous lesions and one osteoblastoma) and nine represented lesions with fibro-osseous elements (one desmoplastic fibroma, one central myofibroma, three aneurysmal bone cysts, one fibromyxoma and three myofibromatosis). The most frequent location was the mandible. Five cases were surgically treated by marginal ostectomy, three by partial ostectomy, nine by enucleation and curettage and six cases of fibrous dysplasia by trimming only. In six cases an extraoral approach was required and in three a bone graft from the iliac crest for reconstruction. The patients were followed-up for a mean of 5 years with no recurrence, except one case of fibrous dysplasia.
Conclusions: Although fibro-osseous lesions share similar features, they exhibit a variety of clinical behaviour, thus the treatment is highly individualized.

O08-59

Evaluation of the effectiveness of liquid nitrogen cryosurgery for the elimination of gingival physiologic pigmentation in adolescent: a 2-year follow-up

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Background: Nowadays esthetics has become a significant aspect in dentistry especially for the adolescents. Although in most cases gingival pigmentation is physiologic, aesthetic concerns regarding 'black gum' are common among adolescents. Numerous procedures have been suggested to treat this problem including graft surgery, gingivectomy, electrosurgery, diamond bur abrasion, laser therapy, and cryosurgery. To date, no known study has been published assessing PGP treatment in adolescent patients.
Aim: The aim of this study was to evaluate the efficacy of cryosurgery with liquid nitrogen for physiologic gingival pigmentation (PGP) removal in adolescents.
Design: Black gums of the anterior segments in 15 patients (nine girls and six boys, aged 11–14) were treated using liquid nitrogen. To obtain better results, the treatment was repeated after 2 weeks. Standard digital photographs were taken preoperatively and at 3, 12, and 24 postoperative months. Using the ImageJ software the darkness value of all images calculated and compared.
Results: No bleeding or pain occurred in any patient during the treatment. Minimal reddish erythema was observed after cryosurgery. Digital analyzing of photographs showed significant differences in gingival color between the preoperative and 3, 12, and 24 postoperative months ($P = 0.000$, 0.007 and 0.001 respectively).
Conclusion: Cryosurgery successfully removed PGP in adolescents. Cryosurgery with liquid nitrogen is inexpensive and requires no special equipment.

O08-60

Secondary osteoplasty in bilateral clefts: 11 years experience

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Background: The maxilla and palate bone discontinuity in cleft patients, usually accompanied by a residual oronasal fistula, is most often finally repaired by a bone graft at the age of 8–12 years. The quite large defect in bilateral cleft cases renders the repair difficult.
Aim: To present the treatment management of bilateral cleft cases.
Design: All young patients with bilateral cleft treated in our Department at the Children's Hospital of Athens, from 2000 to 2010 were included in the study. Treatment plan was scheduled in co-operation with orthodontists. Pre-surgical orthodontics was applied and severely mal-positioned teeth were removed. Intra-operatively, the graft was harvested from the anterior iliac crest with a standardized technique; the cleft site bilaterally was revealed and grafted with the bone in particles and with a cortical plate on top. It was covered without tension by large buccal and palatal mucoperiosteal flaps. The buccal fat pad was additionally used. Post-operative orthodontic treatment was applied. Revision operations were required for the final closure of the defect.
Results: Ten among the 55 cleft cases treated were bilateral; six boys and four girls, with mean age of 11.6 years at the time of operation. Reconstruction of the bone defect was achieved in all cases. Revision operations were required mainly for soft tissue management. Pre- and long-lasting post operative orthodontics was mandate for teeth alignment.
Conclusions: Bilateral cleft cases present multiple difficulties requiring a carefully planned treatment. Several revision operations may be necessary to reach a satisfactory result.

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O08-61

Odontogenic facial cellulitis in hospitalized paediatric population

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Background: Treating facial cellulitis is challenging because of its variable clinical presentations especially in pediatric patients. Pediatric dentists in the hospital settings need to be more familiar with the process of facial infection.
Aim: The aims of this retrospective study were to investigate the clinical characteristics of odontogenic facial cellulitis in hospitalized pediatric patients, and to determine the clinical differences between upper-face and lower-face infections and between those resulting from infectious primary and secondary lesions.
Design: One hundred and fifty hospitalized children (75 boys and 75 girls) treated for odontogenic facial cellulitis at Kaohsiung Chang Gung Children Hospital, Taiwan were selected for this study. The average age was 5.17 ± 2.09 years. Study variables included age, sex, location of cellulitis, source of infection, length of hospitalization, and symptoms and signs of infection during hospitalization. Infections were classified as upper-face or lower-face according to their anatomical location. Infected tooth origins were classified as infectious primary and secondary lesions. The chi-square and *t* tests were used to assess the differences between upper- and lower-face infections and differences between infectious primary and secondary lesions for the various study variables.
Results: Upper-face infections and lower-face infections of hospitalized pediatric children were reported in 56% and 44% respectively. The mean length of hospitalization was 5.15 ± 1.52 days. No significant differences were found for age, sex, symptoms of infection, and length of hospitalization between upper and lower face infections. However, a greater association of upper face infections was more from the upper anterior teeth than the lower anterior teeth in the lower face infections. Fever during hospitalization was found to occur significantly more frequently with a primary infectious lesion than with a secondary infectious lesion ($P < 0.05$). A significant difference was found in the source of infection between primary lesions and secondary lesions, especially in the anterior teeth ($P < 0.05$).
Conclusions: The clinical characteristics of odontogenic upper- and lower-face infections in hospitalized pediatric patients were not clinical significant except in the source of infection. In terms of the effects of the origin of tooth infection, significant differences were found between primary lesions and secondary lesions in fever during hospitalization and source of infection. Although there were slight differences in clinical appearance, almost all of the cases resolved rapidly with correct diagnosis, dental interventions, and antibiotic treatment.

O08-62

Salivary gland neoplasms in children. Report of two cases

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Introduction: Salivary gland neoplasms in children are rare. Pleomorphic adenoma and mucoepidermoid carcinoma, the most frequent benign and malignant salivary gland neoplasms respectively, only rarely affect children.
Case report: *1st Case:* A 15 years old boy initially presented with an asymptomatic 1.5 cm firm mass located in the junction of hard and soft palate. An incisional biopsy was performed revealing mucoepidermoid carcinoma (low grade). Surgical treatment consisted of wide local excision followed by primary closure with buccal fat pad. Histological examination of the surgical specimen confirmed the initial diagnosis. The length of follow up was 1.5 years without any signs of local recurrence or metastasis. *2nd Case:* A 14 years old girl presented with a painless, solid, firm, 6.0 cm mass located in the superficial lobe of the right parotid gland. After clinical and imaging examination, selective surperficial parotidectomy followed by identification and preservation of the facial nerve was performed. Histological results of the surgical specimen revealed pleomorphic adenoma. The follow up time was 2 years and no signs of recurrence were revealed.
Comments: A limited number of salivary gland neoplasms in children have been reported in the literature. Nonetheless, these tumors should be included in the differential diagnosis of lesions affecting the major and minor salivary glands of children. Distinction among the various subtypes of benign and malignant salivary gland tumors is of pivotal importance for selection of the appropriate management.

O08-63

Intraoral distraction osteogenesis for the correction of mandibular malformation. Ten years experience of use in children

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Background: Intraoral distraction osteogenesis was first proposed for the correction of skeletal malformation in the maxillofacial region by Diner in 1996, in order to avoid the discomfort caused by the extraoral appliances.
Aim: The aim of this paper is to present the experience of the authors with the use of intraoral distraction osteogenesis for the correction of mandibular malformation in children in the last 10 years.
Design: During the last decade eight children with mandibular malformation were treated in our clinic with distraction osteogenesis using intraoral distractors. All patients aged from 9 months to 9 years old, while five of them were female and three male. Five were diagnosed with Goldenar syndrome, one with Pierre Robin sequence, one with craniosynostosis, and one presented mandibular asymmetry as a result of rheumatoid arthritis. In all cases intraoral two dimensional distractors were used and the results were evaluated by comparing the preoperative and postoperative clinical pictures, orthopantomographs and 3D CT scans.
Results: In all cases the expected elongation of the mandible was achieved and the adaptation of the soft tissues to the elongation of the mandible was satisfactory. However in asymmetry cases, during growing, the affected side of the mandible continued to under-develop and the asymmetry recurred.
Conclusions: The use of intraoral distraction osteogenesis offers a great contribution to the aesthetic improvement in severe cases of mandibular malformation. However orthognathic surgery during puberty for further correction is necessary in most cases.

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O08-64

Lesions of the oral mucosa in children with systemic lupus erythematosus

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Background: Systemic lupus erythematosus encompasses a group of systemic connective tissue diseases, which are characterized by morphological changes of the orofacial region and are mediated by impairment of immune processes. Specifically autoimmune and immune-complex reactions represent the main pathogenic mechanism of the disease.
Design: One hundred and fifteen children aged 3–17 years with systemic lupus erythematosus (SLE) who were on continuous treatment and follow up in the clinic of the Moscow Medical University were included in the study.
Results: In children with acute course of SLE severe ulcerative-necrotic stomatitis, combined with superficial skin necrosis in the ears, forehead, nose wings, cheeks, lips occurred. In addition hemorrhagic spots were observed on the mucous membranes (submucosal hemorrhage). Lupus enanthema with erythematous, edematous lesions and sharply defined borders were also present. In addition tongue changes in the form of lupus-desquamative glossitis, with atrophy of the papillae and severe edema was another oral finding. Histological examination of the gingival tissues in children with SLE revealed degeneration of the epithelium and infiltration by lymphocytes. Deposition of complement C3 and IgM and IgG immune complexes in the vessel walls was demonstrated by immunohistochemistry and was indicative of vasculitis and vasculopathy.
Conclusions: Our study showed that the oral mucosa is affected in all cases of systemic lupus erythematosus in children and adolescents and in all forms of the disease with a variety of clinical manifestations.

O08-65

Amoxicillin affects the expression of MMP20 in cultured mouse molars

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Background: Amoxicillin courses during the first year of life have been connected to molar-incisor hypomineralisation.
Aim: Our aim was to investigate effects of amoxicillin on the expression of genes involved in enamel matrix formation inculture.
Design: Mandibular first and second molar tooth germs of E15 and E18 mouse embryos were cultured for six dods with amoxicillin (3.6 mg/mL) added to the medium. Control teeth were cultured without amoxicillin. The tooth germs were either processed to paraffin sections, or the first and second molars of E18 + 6d cultures were separated and total RNA was extracted and used for qPCR analysis.
Results: qPCR analysis of the amelogenin degrading proteinase MMP20 gene expression showed no difference between controls and E18 + 6d amoxicillin exposed first molars. However, in exposed second molars the expression was significantly lower than in controls implying a delayed activation of MMP20. These results were confirmed by *in situ* hybridization of E15 + 6d explants where MMP20 expression was clearly lower or totally absent in the ameloblasts of amoxicillin exposed first molars.
Conclusion: The results imply that exposure to amoxicillin delays the onset of MMP20 gene expression before and during early secretory stage.Thus the degradation of enamel proteins may be less effective causing hypomineralisation of the enamel. The results may have clinical significance.
The study was supported by the Academy of Finland, grant 1130443.

O08-66

The effect of plant essential oils upon growth of oral micro-organisms

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Background: Essential oils and their constituent components have been shown to possess various therapeutic properties, including anti-bacterial and anti-fungal activity. For these reasons, certain essential oils have been incorporated into a small number of dental products. This study explored opportunities for the further exploitation of these compounds in the management of oral diseases.
Aim: To assess the *in vitro* effect of plant essential oils and commercially available mouthwashes (containing essential oils) upon growth of potentially pathogenic oral micro-organisms.
Design: Disk diffusion assays were carried out for 25 essential oils and six mouthwashes to assess their activity against *Candida albicans, Lactobacillus casei, Streptococcus sobrinus, Streptococcus viridans* and *Streptococcus pyogenes*. Serial dilutions of promising oils/mouthwashes were then used to establish the minimum inhibitory concentration (MIC) of each and determine their mode of action (bacteriocidal or bacteriostatic).
Results: Twenty two essential oils and five mouthwashes exhibited positive activity against all micro-organisms investigated. Oils rich in terpenoids were particularly effective; for example lemongrass (38–47% geranial, 33–35% neral) was bacteriocidal against *S. sobrinus* and the most effective agent tested against both *C. albicans* (MIC 0.10%) and *L. casei* (MIC 0.05%); equivalent MIC values for chlorhexidine gluconate mouthwash (0.2%) were 0.50% (*C. albicans*) and 0.10% (*L. casei*).
Conclusions: A range of essential oils were effective at inhibiting potentially pathogenic oral micro-organism growth *in vitro*. The data form a baseline for further study of both oil components and their exact modes of action, in addition to *in vivo* studies of their application within oral hygiene products/dental materials.

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Oral Session O09/Dental Materials

O09-67

Restoration of vital posterior teeth with indirect composite resin restorations

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Introduction: The increase of patients' demands for esthetic restorations combined with the dentists' interest for metal-free restorations has led to the development of various tooth-colored restorative materials that vary considerably in composition and require different protocols of clinical application. The clinical use of resin-based restorative material for extensive composite resin direct restorations has limitations, mainly related to polymerization shrinkage and matrix placement, which may cause post operative sensitivity and jeopardize the restorations' longevity. These problems may be overcome with the indirect use of composite resin in forms of inlay, onlay and overlay polymer workpieces.
Case: In this poster presentation, the clinical implementation of so-called immediate dentin sealing (immediate application and polymerization of the dentin bonding agent to the freshly cut dentin prior to impression) will be presented, along with all the other clinical steps of indirect composite resin restorations such as, tooth preparation, impression making, temporization, fabrication of indirect workpiece, preparation of bonding surfaces, adhesive cementation, finishing and polishing.
Comments: The sequence of clinical steps for indirect restorations (preparation – impression making – cementation), that were adopted from the traditional use of metal inlays and onlays, which were cemented with zinc phosphate to dentin and enamel is currently being challenged, as bonding systems have developed and play a major role in adhesive cementation of indirect composite resin restorations in a manner that makes fricative cavities obsolete and provides fewer gap formation, decreased bacterial leakage and reduced dentin sensitivity together with a minimally invasive approach.

O09-68

Electron microscopic study on hybrid layer in primary teeth

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Background: The problem of esthetic restoration of primary teeth is that the therapy with composite resin is very time consuming.
Aim: The aim of our study was to ascertain whether the self etching adhesives, which reduce number of treatment steps and shorten the time of treatment duration, can form in primary teeth a hybrid layer of the same quality as that formed with the total etch technique.
Design: Dentinal adhesives Excite, Prime bond, Single bond, Xeno III, AdheSe and Prompt-L-pop Adper were applied into prepared class I cavities of eighty seven extracted intact primary molars. Teeth embedded into epoxy resin using Epovac were halved, polished and photographed in scanning electron microscope (SEM). The thickness of the hybrid layer was measured and statistically evaluated. Thirty further teeth were treated with the same dentinal adhesives and prepared after demineralization for investigation in transmission (TEM) electron microscope.
Results: Both SEM and TEM investigation demonstrated a well-developed hybrid layer in primary dentin with funnel shaped dentinal tubules in total etch- as well as in self-etching technique. Dentinal adhesives filled fully the dentinal tubules in the extent of the hybrid layer. Significant differences ($P < 0.01$) in the thickness of the hybrid layer were found between individual adhesives.
Conclusions: Our study on submicroscopic structure of hybrid layer in primary dentition formed after usage of total- and self-etching techniques demonstrated no essential morphological difference between the adhesives used. Self etching techniques may be recommended for esthetic fillings in primary dentition. The study was supported by the project 1M0528.

O09-69

Evaluation of pit and fissure enamel etchability of human premolar teeth with and without bio-glass air-abrasion

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Background: Air-abrasion is a pseudo-mechanical, non-rotary method of pretreating teeth using the kinetic energy of a stream of dessicated high velocity abrasive particles to improve etchability. The use of bio-glass particles is under investigation and dyes and digital photographs are used as a means of evaluating enamel etchability.
Aim: To compare etchability following bio-glass air-abrasion and acid etching to that of acid etching alone on human premolar teeth.
Design: Mesial or distal halves of the occlusal surface of 50 teeth were randomly assigned to be exposed to 5 seconds of bio-active glass air abrasion or not. All samples were etched with 37% phosphoric acid. 0.25% Brilliant blue dye was applied to etched surfaces for 45 s. Rinsed and dried occlusal surfaces were then photographed. Standardized digital photographs were qualitatively evaluated in terms of dye uptake as an indicator of etchability of the enamel surface.
Results: A paired t-test confirmed a probability of 0.74 for a positive relationship between air-abrasion of the occlusal surfaces and better Brilliant blue dye uptake, indicative of improved etchability of the enamel ($P < 0.0009$).
Conclusions: Bio-glass air-abrasion improved the etchability of the enamel surface. Hence it could be used as a non-invasive pre-treatment method prior to fissure sealants or bonded aesthetic restorations such as composite resin veneers.

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O09-70

Effect of benzalkonium chloride application on resin-dentine bond strength

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Background: Application of dentine adhesives to demineralized dentine, activates endogenous collagen-bound matrix metalloproteinases principally (MMP) 2, 8 and 9, which results in progressive loss of collagen from hybrid layer. Recently, benzalkonium chloride (BAC) has been shown to be effective in inhibiting MMPs and it may be therefore useful in enhancing the stability of bonded restorations.
Aim: To evaluate the effect of pretreatment of dentine with 0.5% BAC solution on bond strength of etch and rinse adhesives to dentine.
Design: Flat dentine surfaces prepared from 32 extracted caries-free third molars were etched with 37% phosphoric acid for 15 s. The teeth were randomly assigned to one of the two groups ($n = 16$). In Group 1: acid-etched dentine surfaces were treated with 0.5% BAC solution and Group 2: did not have any pretreatment. Dentine surfaces were blotted dried, Single bond (3 M ESPE), or Prime & Bond NT (Dentsply De Trey) applied following the manufacturers' instructions. Composite buildups (Z250, 3 M ESPE) were performed. After storage in water at 37°C for 24 h, bonded teeth were cut into composite-dentine beams for microtensile bond strength testing. Data were analyzed by two-way ANOVA (pre-treatment and adhesives) and Tukey tests ($\alpha = 0.05$).
Results: Pretreatment of dentine with BAC increased bond strength of adhesives to dentine ($P < 0.001$). Different adhesives had no significant effect on dentine bond strength ($P > 0.05$).
Conclusion: Pretreatment of dentine with 0.5% BAC solution increased bond strength of etch-and-rinse adhesives to dentine. Future experiments will examine the effect of benzalkonium chloride on durability of resin-dentine bond.

O09-71

Surface roughness of various restorative materials after topical fluoride application

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Background: Fluoride application is an effective method in preventing dental caries by increasing the resistance of dental hard tissue. However, some studies indicate that various topical fluorides may affect the restoration surfaces.
Aim: The aim of this study was to assess the effect of a single application of two topical fluoride agents; NNaF and APF (neutral sodium fluoride gel 2% and acidulated phosphate fluoride gel 1.23%, respectively) on the surface roughness (Ra) of a high-viscosity glass ionomer (Fuji IX GP), a resin modified nano-ionomer (Ketac N100), a resin modified glass ionomer (Vitremer), two compomers (Dyract AP, Compoglass F) and a nano-filled nonfluoridated resin-based composite (Filtek Ultimate).
Design: All materials were handled according to manufacturer's instructions. ISO standardized specimens was prepared for each material and then stored in distilled water for 24 h. Each sample was polished with 600 and 1200 grit sandpaper on both sides while keeping the material surface wet. Ra measurements were performed on untreated specimens initially and after 1, 4 min and simulated 2-years for both fluoride applications, respectively. The mean Ra values for all specimens were measured using a surface profilometer.
Results: The results of the present study indicated that Ra values for Fuji IX GP and Vitremer increased significantly after all APF, but not NNaF applications. All tested materials exhibited increased Ra values for both treatment regimes, but this was not found statistically significant.
Conclusions: APF gel application significantly increased the surface roughness of both Fuji IX GP and Vitremer for all time periods.

O09-72

Fluoride release and dissolution by two beverages of four glass ionomer cements

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Aim: To investigate the solubility of four glass-ionomer cements Fuji IX™ (FIX), Ketac Molar™ (KM), Zeroglass Aesthetic™ (ZA) and Diamond Carve™ (DC) in apple juice (AJ) and Coca Cola (CC).
Design: Five flat discs (10 mm diameter × 1 mm thick) of each glass ionomer produced in a standard die. Each disc was immersed in vials containing 10 mL of either water (pH 5.7) (control), AJ (pH 2.9) or CC (pH 2.5) maintained at 37°C. The solutions were changed every 24 h over the period of 60 days and the weight of each specimen was recorded. The amount of F released from each GIC in water was recorded daily for 60 days.
Results: The dissolution in CC was similar for FIX, KM and DC ranging from 44% to 49%, the least soluble being ZA (13%). With apple juice ZA was again the least soluble (26%) followed by KM (56%). However considerable weight loss was seen for both FIX and DC which had almost completely dissolved by 56 days. The release of F into the water control was highest for ZA followed by DC, KM and FIX.
Conclusions: In conclusion the four GICs all appear to be degraded by immersion in apple juice and Coca Cola. Apple juice was the more corrosive. ZA was least affected and also released the highest amount of Fluoride. This study highlights the potentially damaging effects of apple juice on GIC restorations and should possible inform our advice concerning the excessive consumption of soft drinks.

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O09-73

Bond strength of a fissure sealant treated with different antibacterial agents using simplified fissure model

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Aim: The aim of this *in vitro* study was to evaluate the micro-tensile enamel bond strength of a fissure sealant treated with different antibacterial agents using the simplified enamel fissure model.

Design: Bovine mandibular incisors were randomly divided into four groups for treatment with one of the following groups: A. phosphoric acid %35 + Clinpro sealant®; B. phosphoric acid 35% + Clearfil protect bond + Clinpro sealant®; C. phosphoric acid %35 + Consepsis Scrub® + Clearfil SE bond® + Clinpro sealant®; D. phosphoric acid %35 + Clearfil SE bond® + Clinpro sealant®. Two pieces of enamel (4 × 6 mm each) were secured with sticky wax on a sterile glass slide to a mean distance of 0.6 ± 0.1 mm. The enamel bars (≈1 × 1 mm) were submitted to tensile tests at constant crosshead speed (1 mm/min) using a universal testing machine and tested for each adhesive. For group A, B, C and D; 26, 27, 30 and 21 specimens were tested respectively. Fractured surfaces were inspected to determine the mode of fracture.

Results: The bond strength of group C (34.63 ± 15.59 MPa) was significantly higher than that of group A (19.86 ± 7.08 MPa) (*P*: 0.0001), group B (24.49 ± 9.38 MPa) (*P*: 0.002) and group D (19.84 ± 9.92 MPa) (*P*: 0.0001). With the μTBS tests; there were no statistically significant differences in fracture pattern between all the groups. (*P*: 0.343).

Conclusions: The bond strengths of a cavity disinfectant applied antibacterial self-etching primer system were significantly higher than an antibacterial self-etching primer system, a self-etching primer system and a conventional acid etching system.

O09-74

The effectiveness of aging to the new-aged resin shear bond strength

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Background: Minimal invasion technique often requires the repair of failed composite restorations rather than the replacing of them.

Aim: The aim of this study was to evaluate the modification of shear bond strength (SBS) of resin restorative materials, immediately after placing and after artificial aging process.

Design: The SBS was tested between the following resin pairs: (i) aged 3M Ultimate – new 3M Ultimate (ii) aged 3M Silorane – new 3M Silorane (iii) aged 3M Ultimate – new 3M Silorane (iv)aged 3M Silorane – new 3M Ultimate. Specimens were aged in artificial saliva for 7 days. The aged resin surface were treated prior to the adding of the new resin as follows: group 1 air flow and H_3PO_4 35%, group 2 air flow and NaClO 5.25%, group 3 diamond bur and H_3PO_4 35%, and group 4 specimens diamond bur and NaClO 5.25%. Shear testing was conducted at cross-head speed of 0.5 mm/min. Failure patterns were analyzed using a stereomicroscope for determination of the failure modes and samples were processed for SEM evaluation.

Results: Shear bond strength between aged and new 3M Ultimate resin, were found to be statistically higher when comparing to the other two material combinations, regardless of the surface treatment prior to the new resin applying.

Conclusions: Damaged 3M Ultimate restorations may be repaired with the use of the same material. On the other hand 3M Silorane restorations cannot be effectively repaired either with the use of the same material or a different one.

O09-75

Evaluation of marginal adaptation and seal of minimally invasive occlusal restorations before and after simultaneous thermal and mechanical stress: an *in vitro* study

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Background: According to the WHO, the 3rd level prevention is defined as the reduction of the negative impact of an already established disease by restoring function and reducing disease related complications and propagation. In this respect, minimal invasive dentistry immediately stops the progression of the carious lesion while saving healthy tissue.

Aim: The aim of this *in vitro* study was to evaluate the marginal adaptation of three different materials used for treating minimally invasive occlusal cavities.

Design: Thirty caries free, upper human molars, randomly assigned into three experimental groups were prepared with minimally invasive occlusal cavities, adhesively pre-treated with Optibond FLand restored with three different materials (Gr. 1: Optibond® FL Adhesive, Gr. 2: Premise® Flow, Gr. 3: Premise®) and mechanically and thermally loaded. Marginal adaptation in % 'continuous margin' was evaluated in the SEM before and after loading and micromorphology of the occlusal contact area was qualitatively assessed. Finally, a dye penetration test was performed after loading.

Results: Means (±SD) of % 'continuous margin' before/after loading were as follows: Gr.1: 97.8 (1.7)/95.0 (4.5); Gr.2: 98.1 (2.6)/97.3 (1.7); Gr.3: 99.7 (0.6)/97.4 (1.4). There were no statistically significant differences among the three groups, both before and after loading (ANOVA, $P < 0.05$).Morphological differences were observed in the occlusal contact area between groups. Dye penetration was absent in all groups.

Conclusions: Filled bonding (Gr. 1), flowable composite (Gr. 2) and restorative composite (Gr. 3) showed comparable marginal adaptation and seal in minimally invasive occlusal cavities.

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O09-76

Curing depth of colored polyacid-modified composite resins based on micro raman spectroscopy evaluation

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Aim: The present study aimed to evaluate the effect of shade on the depth of cure (DoC) of a colored polyacid-modified composite resin (PAM-C) with a traditional PAM-C and a composite resin as control on the basis of the degree of conversion (DC) using micro raman spectroscopy (MRS). It also aimed to compare the DoC based on these results with that previously obtained with the penetrometer and the Knoop hardness depth profile (KHN).
Design: A colored PAM-C (Twinky Star®,Voco) with shades blue, gold and silver, a conventional PAM-C (Glasiosite®,Voco) and a composite resin (Z250®, 3M Espe) with shades A2, A4 and B3 were used. The samples were light cured in bulk using a conventional halogen-based unit (Elipar trilight, E = 32 J/cm^2) in split stainless steel moulds. After curing, the samples were embedded in a polyacrylic resin and separated in the middle towards the direction top-bottom. The DC was measured down from the surface every 0.250 mm.
Results: Statistical analysis demonstrated that the DC as a function of depth depended significantly ($P < 0.001$) on the shade and the formulation of a given material. The penetrometer test method apparently overestimates the DoC compared to the method based on MRS and KHN depth profiles. Moreover the ranking of the mean DoC of the different materials and shades differs depending on the method.
Conclusions: From this study it became clear that the DC as a function of depth differs significantly among the different materials and shades. Glasiosite shade A2 showed the highest DoC, and the Twinky Star shade gold the lowest.

O09-77

Effect of saliva contamination on the combination self-etching system and resin-modified glass ionomer: shear bond strength tests and scanning electron microscopy observations

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Background: In minimally invasive pediatric restorative dentistry it is difficult to ensure dry field conditions while bonding. Adhesives and dental materials producing an effective bond even in the presence of saliva contamination would be beneficial. Studies reported that easy-to-use self-etching adhesives (SEA) increase the dentine shear bond strength (SBS) of resin-modified glass ionomers (RMGI).
Aim: The purpose of this investigation was to evaluate the effect of saliva contamination on this association at various stages of bonding, by SBS tests and scanning electron microscopy (SEM) observations.
Design: Sixty cylinders of RMGI (Fuji II® LC, *GC*) were bonded on 60 teeth embedded in self-cure resin, exposing a flat surface of dentine. Fifteen were bonded on no-treated dentine, 15 after application of SEA (IBond® self-etch, *Heraeus*), 15 after saliva contamination followed by an application of SEA and 15 after application of SEA followed by saliva contamination. Ten samples of each group were shear tested and the type of bond failure was noted. A Kruskal–Wallis test was performed followed by Games-Howell *post-hoc* pairwise comparison tests on the SBS results and a chi-square test for the analysis of bond failure ($P < 0.05$). The last five samples of each group were sectioned perpendicularly to the bonded surface and examined with SEM.
Results: SEA improved the bond strength (15 ± 2 MPa) even in presence of saliva (before SEA 20 ± 7 MPa or after SEA 19 ± 6 MPa). SEM observations revealed a copolymerization between SEA and RMGI even in presence of saliva.
Conclusions: The Combination SEA + RMGI triples the SBS of RMGI and seems to tolerate saliva contamination.

O09-78

Preservation of the dentin hybrid layer: matrix metalloproteinases and resin-based dentin bonding systems

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Background: Matrix metalloproteinases (MMPs) have been shown to degrade the hybrid layer. Because Benzalkonium chloride (BAC) is reported to be both antimicrobial and to deactivate enzymatic activity, BAC was added to a resin-based dentin bonding system.
Aim: This study tested the shear bond strengths (Ultradent method and gel cap) of human dentin and enamel bonded with One Step SE with and without BAC. Phase separation was measured and compared with two other 7th generation self etch adhesives.
Design: The composite was fractured from the bonded tooth surfaces utilizing an Instron and the values statistically analyzed. Evaporations of the One Step SE and two commercial ones (Xeno IV, Dentsply; Optibond All-in-one, Kerr) were monitored under a microscope for up to 10 min. Water bubbles (or phase separation) generated by solvent evaporation were measured for quantity and the size.
Results: No phase separation was measurable with One Step SE but both controls demonstrated phase separation.

Table 1. Results.

	Bond strength in MPa, Ave (SD)[3] One-Step SE
Enamel (cut)	23.4 (5.7), *n* = 6
Enamel (un-cut)	18.2 (5.4), *n* = 6
Dentin	38.9 (9.5), *n* = 8
	18.8 (4.7), *n* = 6 (#5-gel cap)
	19.0 (2.4), *n* = 7 (#5-gel cap)
	One-Step SE w/BAC
Enamel (cut)	21.4 (2.4), *n* = 8
Enamel (un-cut)	22.2 (4.5), *n* = 6
Dentin	32.6 (4.2), *n* = 7
	18.2 (3.9), *n* = 6 (#5-gel cap)
	17.1 (3.2), *n* = 6 (#5-gel cap)

Conclusions: The inclusion of BAC to the self etch adhesive, One Step SE (Bisco), did not statistically reduce the SBS of the adhesive to enamel and dentin. In addition, the inclusion of BAC did not produce measurable phase separation of the adhesive One Step SE.

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Oral Session O10/Cariology 3

O10-79

Radiographic extension of sealed occlusal caries lesions after 3 years

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Background: SEAL-DK is an ongoing clinical study of sealing *versus* restoring manifest occlusal caries lesions in young permanent teeth.
Aim: To use a new method for quantitative assessment of the depth of sealed SEAL-DK lesions at baseline and after 3 years, and to relate the findings to treatments performed during the follow-up period.
Design: By February 2011, the material comprises 99 sealed occlusal caries lesions followed by annual recalls for 3 years ± 3 months. The dentinal depth of the lesions was measured and expressed as percentage of the width of the tooth at column in radiographs from baseline and last control.
Results: At baseline, four lesions had no dentinal extension, 73 lesions extended to the outer third of the dentin, and 22 to the middle third. At last control seven lesions showed caries regression, 76 were unchanged, and 22 showed caries progression. The progression was independent of lesion extension at baseline ($P > 0.05$). During follow-up 19 lesions were resealed: one lesion with caries regression and 18 arrested lesions. Furthermore, 27 lesions were restored with composite: two lesions with caries regression, 17 arrested lesions and eight lesions with caries progression.
Conclusions: The study has shown that the dentinal depth and development of sealed occlusal caries lesions can be quantified; that some lesions are arrested, some show caries progression and some a decrease in the dentinal depth 3 years after sealing. Some discrepancies were found between the standardized measurements of lesion development and the dentists' choice of treatment during the follow-up period.

O10-80

Aquaporin 5 is associated with caries experience

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Background: Twin studies suggest that genes modulate susceptibility to caries.
Aim: Investigating if variation in aquaporin (AQP) genes contributes to caries.
Design: DNA samples of 316 adult subjects from Pittsburgh, 192 children 3–6 years of age from Istanbul, and 274 subjects from 76 families from Argentina were studied. DMFT/DMFS scores were available from all subjects. Markers for the AQP gene cluster were selected. We used logistic regression to predict caries. Genetic markers in the Argentinian families were tested based on geographic origin with and without fluorosis. RNA samples extracted from saliva were also available from a subset of 118 subjects from Argentina. Relative levels of AQP5 expression were determined in reference to the internal control gene beta-actin.
Results: Analyses showed AQP markers are associated with higher caries experience in females from Pittsburgh ($P = 0.003$). Regression analysis showed that higher caries experience is influenced by the combination of older age, use of medications, and genetic variation ($P = 0.03$). To eliminate the age effect, data from children was studied and the same association between genetic markers and caries was found ($P = 0.03$).Genetic markers were also associated with high caries experience in families from sites without fluorosis ($P = 0.01$). AQ5 expression tended tobe higher in individuals with lower caries experience ($P = 0.08$).
Conclusions: Genetic variation in AQP is associated with cariesin three independent populations. AQP5 may be a good target for future gene therapy approaches that may reduce or prevent caries susceptibility. This work is supported by the NIH-R01-DE18914 (USA) and CNPq/INAGEMP-573993/2008-4 (Brazil).

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O10-81

Outcomes of the Hall technique for managing carious primary molars in a community setting

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Background: The Hall Technique (HT) is a simplified method of managing carious primary molars by sealing caries under preformed metal crowns (PMCs) without need for local analgesia and tooth preparation.
Aim: To determine clinical outcomes and acceptability of HT in children treated by experienced paediatric dentists in a community dental service.
Design: Data were collected prospectively (from October 2007 for 37 months) at initial treatment and 6-monthly thereafter from children receiving HT PMCs. Data included clinical parameters and dentist, child and parent satisfaction. Using clinical audit methodology, results were compared with a published randomized controlled trial set in general dental practice.
Results: Fifty-five HT PMCs were fitted in 24 children aged 3.6–10.6 years (mean = 7.6 years). The child was operator-assessed as unable to tolerate conventional treatment in 39/55 (71%) of treated teeth. Marginal ridge breakdown was present in 23/55 teeth (42%). Radiographically caries extended over half way into dentine in 19 of the 44 teeth with radiographs. 47/55 (85%) PMCs were clinician-rated as causing insignificant discomfort at fit and 54/55 (98%) as achieving a good fit. At 6-months 52/55 (95%) were clinically successful and at 12-months, 33/36 (92%). Failures ($n = 3$) were one abscess 2 days after placement, one sinus at 6 month review, one crown replaced. Dentist/child/parent satisfaction was 52/53/53 (95/96/96%) at 6-months. Comparable outcomes to those previously published were achieved.
Conclusions: HT PMCs were successful at 6- and 12-month follow-up in clinical situations that would otherwise require local analgesia and tooth preparation and were acceptable to dentists, children and parents.

O10-82

Comparison of two calcium phosphate pastes in remineralization of artificial caries *in situ*

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Background: The focus in caries research has shifted to the remineralization of early caries lesions. Various calcium phosphate-based remineralization systems have been developed and are available.
Aim: Compare the efficacy of two calcium phosphate pastes (CPP-ACFP paste and functionalized tri-calcium phosphate paste) in remineralizing artificial caries *in situ*.
Design: The study design was a double-blind crossover *in situ*, involving two experimental phases of 14 days each, with a 7-day washout period between the two phases. Three healthy subjects wore acrylic palatal appliances which contained six human enamel slabs. The subjects were instructed to apply experimental pastes two times per day. For group A, subjects brushed their teeth while the appliances were in their mouths with 1.0 g of fluoride toothpaste for 2 min. After brushing, subjects smeared 0.25 g of CPP-ACFP paste (Tooth Mousse Plus; GC Corporation) on the enamel slabs. For group B, subjects brushed their teeth and the appliances with 0.25 g of functionalized tri-calcium phosphate paste (Clinpro™ Tooth Crème; 3M ESPE) for 2 min. After 14 days, the enamel slabs were embedded in resin, sectioned into 100–150 μm thickness. Eighteen specimens per group were examined with a polarized light microscope.
Result: The mean lesion areas reduction of group A and B were 0.035 ± 0.011 mm^2 and 0.034 ± 0.013 mm^2, respectively. Both groups showed significant reduction of lesions compared to controlled sections (paired *t*-test, $P < 0.05$). However, there was no statistical difference between groups (independent *t*-test, $P > 0.05$).
Conclusions: This study shows remineralizing effects of both calcium phosphate pastes.

O10-83

Effect of contact time with fluoride toothpaste on prevention of enamel demineralisation *in vitro*

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Aim: To investigate the effect of varying the contact time of fluoride (F) toothpaste on prevention of enamel demineralisation *in vitro*.
Design: Baseline surface microhardness (SMH) and Knoop number (KHN) were determined for 100 bovine enamel slabs which were then randomly allocated into five groups (20/group) and subjected to a pH cycling regime for 10 days. The pH cycling regime involved immersion five times daily (each for 5 mins) in demineralising solution with the slabs immersed in artificial saliva in between dippings. The five groups of enamel slabs were treated with a F toothpaste (1450 ppm F) slurry for either: 0, 1, 2, 5 or 10 mins twice daily. The five groups were coded to enable blinding for the subsequent SMH re-measurements and then the differences from baseline were statistically analysed using SPSS 17 with ANOVA and Bonferroni correction tests.
Results: Mean differences in SMH KHN were: 208.3; 167.9; 150.5; 148.5 and 138.6 for the 0, 1, 2, 5 and 10 mins groups respectively. Statistically significant differences were observed for all four contact times compared to the control 0 mins group ($P < 0.01$). The 2, 5 and 10 min contact time groups were all significantly different compared to the 1 min group ($P < 0.01$). There were no significant differences between the 2, 5 and 10 min contact time groups.
Conclusions: Increasing the contact time with fluoride toothpaste improved the prevention of enamel demineralisation. The minimum contact time was shown to be at least 2 min.

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O10-84

Application of quantitative light-induced fluorescence (QLF) to screen demineralization potential of human saliva; a pilot study

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Background: Although it is known that enamel lesions can be remineralized by salivary mineral components, no clinical test to screen remineralization promotive aspects of saliva has been developed yet.
Aim: The aim of this study was to examine the effects of salivary Ca contents on enamel remineralization by combined means of a human saliva model (HSM) and Quantitative Light-induced Fluorescence (QLF™) *in vitro*.
Design: The enamel slabs cut from bovine incisors were demineralized by immersion in a 0.1 M lactic acid solution (pH4.5) at 37°C for 2 day, and then exposed to (A) human whole saliva with 0.35 mM Ca (B) whole saliva with 0.92 mM Ca or (C) whole saliva stimulated with a Ca enriched chewing gum (POS-CAM, Ezaki Glico, Japan; 3.8 mM Ca) for 24 h at 37°C ($n = 6$ per group). The samples were assessed by QLF™ before and after the saliva treatments to measure mineral uptake as ΔF recovery ($\Delta\Delta F$, %).
Results: The $\Delta\Delta F$ values in the groups B (6.3 ± 3.9%) and C (10.5 ± 3.6%) were significantly higher compared to the group A (0.6 ± 0.4%; $P < 0.001$, Tukey-Kramer multiple comparisons), and the group C showed significantly greater the $\Delta\Delta F$ values compared with the groups B ($P < 0.01$).
Conclusions: In conclusion, it was suggested that QLF™ was sensitive enough to detect saliva-induced mineral recovery of enamel within 24 h, and the combined methods of the HSM and QLF™ can be a clinical test to screen remineralization potential of human saliva.

O10-85

Change in salivary parameters following head and neck radiotherapy

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Background: Saliva is a complex biological fluid which plays a major role in maintaining the oral health and function. Head and neck radiation treatment for cancer patients may result in destruction of the salivary glands, and therefore compromise oral health leading to caries and erosion.
Aim: The aim was to analyze a range of saliva parameters in a group of head and neck radiotherapy patients before and after radiation treatment in order to determine the induced changes in these parameters.
Design: Twenty-two patients undergoing 6–7 week head and neck radiation therapy were selected. Saliva was collected before and after therapy and analyzed for Ca^{2+} concentration, buffer capacity, pH, consistency and flow rate.
Results: No significant difference was observed in Ca^{2+} concentration, pH and buffer capacity pre- and post-treatment in most cases. There was significant decrease in the salivary flow rate from 0.03 mL/s pre-treatment to 0.01 mL/s post-treatment. However, four post-treatment cases with the lowest flow rate showed extremely high Ca^{2+} concentrations.
Conclusions: Post-radiotherapy xerostomia seems to be characterized only by the lack of saliva and change in its consistency rather than its composition. It is suggested that the lack of saliva as a whole is related to increased caries risk rather than lack of a specific component. However, the dramatic increase in calcium concentration in the four severe treatment cases suggests a possible contamination of samples with blood and the radiation frequency. A special care is required in saliva collection for these patients and novel protocols need to be developed.

O10-86

Early childhood caries and related factors in Turkish preschool children

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Background: Early childhood caries (ECC) has been widely studied but, still remains a serious public health problem.
Aim: The objectives of the study were to determine the prevalence of ECC and the oral health status in preschool children in Ankara. This study also aimed to assess the feeding practices, sugar and snack consumption and dental health behaviour at preschool children.
Design: The sample included 312 (165 boys, 147 girls) children from 24 to 71 months of age who referred to the pediatric dental service for assessment of oral health status. Prior to child's clinical dental examination, the mothers were interviewed based on structured questionnaire in order to obtain information regarding demographic, infant feeding and dental health behaviour variables. The data were analyzed using the chi-square and one-way analysis of variance procedures.
Results: Ninety percent of the children had ECC with a mean deft of 6.73 ± 2.4. The mean deft of the boys and girls was 7.06 and 6.35 respectively. The difference in mean deft of ECC between boys and girls was statistically not significant. Of the children, 44% were solely breastfed, 54% were both breastfed and bottle-fed and 2% were only bottle-fed. Mean duration of breastfeeding was 15.5 months and children mean age that commenced regular toothbrushing was 2.5 years. Daytime sugar intake was high in 52% of children.
Conclusions: The majority of preschool children in this study had a high prevalence of caries experience and multiple risk factors are involved in the development of early childhood caries.

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O10-87

Pulpal responses to caries process in human teeth

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Background: Dental caries is the most common cause of pulp disease, in which products of bacterial metabolism elicit an inflammatory and immunological reaction.
Aim: This study was undertaken to show the presence of immune components in the dental pulp and to determine how and which immunocompetent cells infiltrate the pulp in association with the development of carious lesions.
Design: We have analyzed 150 teeth with different stages of progression of the carious lesion. The condition of the pulp was classified into five groups according to the progression of the carious lesions from stages S0 (non-carious teeth) to S4 (exposed pulp). Pulp tissue was treated with indirect immunoperoxidase technique using monoclonal antibodies reactive to pan-T lymphocytes, B-lymphocytes, HLA-DR for dendritic cells and CD68 for macrophages.
Results: The immune response in the unaffected pulp is linked with the presence of antigen-presenting cells (pulp dendritic cells and macrophages) and T lymphocytes. The number of T lymphocytes showed an increase in teeth with shallow dentinal caries, while B-lymphocytes increased only in teeth with deep caries. A substantial change in the infiltration of immunocompetent and antigen-presenting cells occurred between S2 and S3, with a remarkable increase in the number of B-lymphocytes. Therefore, the pulpal immune reaction to carious stimuli could be classified into early phases (S1-S2) with reversible changes and advanced phases (S3-S4) with irreversible changes in the pulp.
Conclusions: All these observations indicate that the processes occurring inside the caries lesion are deeply affecting the pulp tissue and the early treatment of the carious lesion will be the only biologically rational approach.

O10-88

The effect of four remineralising agents on the remineralisation and demineralisation of human dental enamel *in vitro*

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Background: The hardness of dental enamel is reduced during dissolution in acids and may increase if remineralisation takes place. Using nanoindentation techniques it is possible to detect very small changes in these mechanical properties.
Aim: To investigate the effects of four treatments on the remineralisation and the inhibition of subsequent demineralisation of dental enamel.
Design: Nanoindentation was used to determine the hardness of polished human enamel specimens ($n = 8$ per group, five indents per specimen) at baseline (B), after demineralisation in 0.3% citric acid (pH 3.2) for 20 s (D1), after treatment (T) and after a second demineralisation (D2). Treatments were nothing (control), saturated hydroxyapatite solution for 60 min, 1400 ppm NaF for 2 min, 4500 ppm NaF for 2 min or GC Tooth Mousse for 5 min. The exposure times were chosen according to manufacturers' guidelines and likely clinical exposure. Data were analysed using a Mann-Whitney test.
Results: D1 resulted in a statistically significant reduction in hardness, from an average of 1.13–1.87 GPa. Three treatments resulted in a statistically significant increase in enamel hardness (from D1 to T): 4500 ppm NaF, saturated hydroxyapatite solution and Tooth Mousse. However, the total change in hardness, from B to D2, was statistically indistinguishable for the five groups.
Conclusions: Saturated hydroxyapatite solution, 4500 ppm fluoride and Tooth Mousse appeared to remineralise enamel specimens after a 20 s demineralisation. None of the treatments afforded protection against subsequent demineralisation since the difference between baseline and endpoint hardness was the same for all groups.

O10-89

Failure rates of class II restorations in Norwegian adolescents

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Background: Tooth-colored restorations are increasingly used as filling materials for Class II restorations in permanent premolars and molars, and seem to substitute the use of amalgam.
Aim: The study aimed to compare failure rate and reasons for failures of class II restorations in the young permanent dentition.
Design: The study had a prospective, non-randomized design and comprised consecutively performed routine treatments.
Results: From 2001 to 2004, 27 dentists in the Public Dental Health Service in Norway placed 4030 Class II restorations in 1874 patients with a median age of 15.5 years (SD = 3.10). Restorative materials used were resin composite (81.5%), compomer (12.7%), amalgam (4.6%) and glass ionomer cement (1.2%). 91.7% of the restorations were placed due to primary caries and 6.4% were replacements. During a 4-year observation period, 12.4% of the restorations were replaced. Secondary caries was the main reason for replacement (67.2%) in all groups of restorative materials, followed by lost restorations (11.3%) and fractures (7.0%). Kaplan–Meier survival curves demonstrated a significantly higher 4-year failure rate in resin composite compared to amalgam (10.5% *vs* 3.2%, $P < 0.05$). Compomer and GIC were not included in the survival analyses due to few fillings.
Conclusions: Higher failure rate was found for class II resin composites compared with amalgams during a 4-year observation period. The main reason for replacement in all groups was secondary caries.

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O10-90

Remineralizing action of CPP-ACP reagents on artificial carious lesions

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Aim: To evaluate the efficacy of CPP-ACP containing pastes; Clinpro® (500 ppm tri-calcium phosphate +950 ppm sodium fluoride) and Tooth Mousse Plus® (10% CPP-ACP + 900 ppm sodium fluoride) in remineralizing artificial enamel carious lesions.

Design: Fifty extracted human third molars were cleaned of soft tissue debris and inspected for any cracks, caries or hypoplasia. The teeth were painted with an acid resistant nail varnish leaving a 1 mm window on the buccal and lingual surfaces and then immersed in a demineralizing solution for 96 h, to produce artificial carious lesions 90–180 μm deep. Subsequently, the teeth were sectioned longitudinally through the lesion to produce sections that were approximately 100–150 μm thick. The tooth specimens were randomly divided into four groups (n = 29) and treated with a non-fluoridated or fluoridated paste (for 1 min), Clinpro® or TM Plus® pastes (for 3 min) in a 10 day pH cycling model. Lesion depth (LD) and mineral content (V*max*) for each specimen were evaluated using polarized light microscopy (PLM) and microradiography (MRG) before and after the pH cycle. Paired t-test, ANOVA and Student-Newman–Keuls tests were employed to make comparisons within, and between the different treatment groups.

Results: Significant differences were evident when comparisons were made between the pre- and post-treatment specimens within each group. When multiple comparisons were made, specimens treated with Clinpro® exhibited the greatest reduction in LD and increase in Vmax as compared to the other treatment groups.

Conclusion: A three minute application of Clinpro® exhibited a higher efficacy in remineralizing artificial enamel carious lesions than TM Plus®.

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Oral Session O11/Periodontology – Dental Trauma 1

O11-91

Severe periodontal destruction in a young patient caused by orthodontic elastic bands left in place for 12 years

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Introduction: The present report describes a case of extensive periodontal destruction caused by orthodontic elastic bands slipping apically into the periodontal tissues.
Case report: Twelve years after placement of the orthodontic elastics, the patient presented in his mid-twenties with severe damage to the periodontium of all four maxillary incisors rendering this, to the best of our knowledge, the longest period reported during which elastics were left lodged *in situ*. Subsequent questioning revealed that the patient had discontinued his orthodontic treatment in his early teenage years, resulting in the orthodontic bands becoming forgotten. Removal of the bands was possible through the orifices of established sinuses and non-surgical periodontal treatment was attempted. At a subsequent visit, access surgical flap followed to ensure no remnants were left *in situ* and to thoroughly debride the defects. At 6 months post-operatively, substantial reduction of pocket depths, resolution of gingival inflammation and sealing of the sinuses had occurred.
Comments: The present report points out important clues that aid in diagnosing and discusses the differential diagnosis a clinician may formulate. It emphasizes the importance of informing orthodontic patients on the correct use of elastic bands as well as warning them on potential risks and it suggests measures to prevent their displacement into the tissues.

O11-92

Enamel matrix derivatives alone or in combination with bone grafts can modify cell attachment, proliferation, osteoblastic differentiation and osteoprotegerin production of human periodontal ligament fibroblasts

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Background: New therapeutic strategies for promoting regeneration of hard and soft periodontal tissues involve biological mediators locally applied. Recently, a combination of Enamel Matrix Derivatives (EMDs) with a fully synthetic bone graft substitute [a porous biphasic β-tricalcium phosphate (β-TCP) and hydroxyapatite (HA)] was introduced.
Aim: Human periodontal ligament cells (hPDL) were used to assess the *in vitro* effects of EMDs alone or in combination with the bone graft on (i) the regulation of gene expression of bone regulatory factors such as; bone morphogenetic proteins −2, −4 and −7 (BMP-2, -4 and -7), receptor activator of nuclear kappa B ligand (RANKL) and osteoprotegerin (OPG) and (ii) protein expression of a marker of osteoblastic differentiation (Alkaline Phosphatase-ALPase).
Design: hPDL cell attachment and proliferation was assessed using a dye reduction assay. Gene expression of BMP-2, -4 and -7, RANKL and OPG was determined using RT-PCR analysis. A colorimetric assay for the determination of ALP was used.
Results: EMDs treated cells revealed: increased proliferation rates compared to control cells, up-regulated gene expression of BMP -2 and -4 and increased ALPase activity. RANKL mRNA levels were found to be lower in treated cells and OPG mRNA was found to be significantly higher in treated cells.
Conclusion: The experimental findings for hPDL proliferation and differentiation support the idea that treatment with EMDs not only increases the pool of cells responsible for tissue regeneration, but, also, stimulates early differentiation events, and thus may enhance the regenerative process *in vivo*.

O11-93

Milk and egg white maintain immature pulp cells' proliferation capacity as well as hank's balanced salt solution (HBSS)

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Background: Avulsions of permanent teeth before completion of root development can lead to loss of pulp vitality. It is possible to create an environment that favors coronal proliferation of new tissue leading to replace the sterile necrotized pulp and subsequent continued root development.
Aim: In this study we compared milk and egg white (as available storage media at accident scenes) with HBSS to maintain pulp cells' proliferative capacity.
Design: Sixty rabbit open apex incisors were randomly stored for 1, 3 or 6 h in tubes containing milk, egg white or HBSS at 4°C, immediately after extraction. Following fixation and decalcification of teeth, ki-67 antigens were detected in pulp sections by immunohistochemically evaluation. The mean values of labeling indices were analyzed using 'repeated measure ANOVA' test.
Results: Labeling indices of dental pulp cells stored in milk and egg white showed a similar result to those of HBSS in all studied time intervals (P value = 0.835). In all specimens, Ki-67-marked cells seem to be more in the apical region of the pulp, followed by the middle and coronal regions, respectively (P value < 0.001).
Conclusions: Beside availability and lower cost of milk and egg white, their efficacy seems to be similar to HBSS, in terms of 'rabbit's dental pulp cells' viability' in 6 h. Preserving more Ki-67$^+$ cells in apical region helps proliferation of new tissue, replacement of necrotized coronal pulp and subsequent continued root development.

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O11-94

Effect of fibroblast growth factor and enamel matrix derivative treatment on periodontal healing mechanism after tooth replantation

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Background: Periodontal ligament (PDL) healing and long term prognosis of replanted avulsed teeth depend on several factors such as length of extraoral dry time and type of the storage medium. Different substances have been used for root surface treatment to promote formation of PDL and increase the survival of avulsed teeth submitted to replantation.
Aim: The purpose of this study was to assess the effect of Fibroblast Growth Factor-basic (FGF) and enamel matrix derivative (EMD) on periodontal healing and analyze the effect on different storage conditions (milk and dry) on delayed replanted teeth.
Design: Thirty incisor and premolar teeth were extracted from the Beagle dogs and stored into whole bovine milk or keep in dry at the room temperature for 45 and 60 min. Following storage periods sockets washed and teeth were treated with FGF, EMD and combination of FGF and EMD and replanted into the sockets. After 8 weeks dogs were sacrificed, specimens processed to 4-μm thick serially-sections for histopathologic examination.
Results: Teeth stored 60 min were significantly higher incidence of PDL resorption that those store for 45 min ($P < 0.01$). The highest incidence of replacement resorption was observed in teeth treated with EMD for 60 min. After 8 weeks, the least surface resorption was found in FGF and combination of FGF and EMD group ($P < 0.01$).
Conclusions: The results indicate that use of EMD shows replacement resorption which may turn to ankylosis. FGF group showed periodontal ligament-like, newly formed connective tissue. FGF and combination of FGF and EMD favored the formation of new periodontal ligament; prevent ankylosis and resorption process following replantation of teeth.

O11-95

An investigation into the factors influencing the number of treatment visits following dento-alveolar trauma

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Aim: To investigate factors that influence number of visits children require for treatment, following dento-alveolar trauma to permanent dentition.
Design: A retrospective convenience sample of 100 children who attended at LDI between April 2003 and April 2007 was identified. The following data were collected from clinical records: age, gender, postcodes, number of visits, treatment provided, number of teeth injured, type of periodontal and hard tissue injuries, healing modality, root maturity, pulp and tooth survival and repeat trauma. Data was analyzed using SPSS 17.0 and Stata 11.0. A multilevel model (Poisson regression) was developed to identify factors, which significantly influence number of visits required for completion of treatment.
Results: One hundred and eighty five teeth in 100 patients were identified. Age ranged from 5 to 16 years with mean of 9.0 years (SD = 2.3) and a M:F ratio of 3:2. Mean number of injured teeth per incident was 1.7. Mean total number of visits was 8.7. The model showed number of visits increased significantly with complicated hard tissue injuries involving pulp ($P < 0.005$) and severe luxation ($P < 0.04$). Pulp necrosis also resulted in increased number of visits ($P < 0.01$). Fewer visits were needed when patient had mild luxations ($P < 0.006$) or when tooth has poor periodontal prognosis and no further treatment was provided ($P < 0.03$). The number of visits also increased significantly with further trauma to same tooth and with increasing number of teeth affected.
Conclusion: Severe luxation, complicated hard tissue injuries and pulp necrosis were significantly related to number of treatment visits needed. These findings have a cost implication to health services for provision of treatment for dento-alveolar trauma in children.

O11-96

Characterization of dental pulp stem cells from deciduous and supernumerary teeth

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Aim: The purpose of this study was to assess the value of supernumerary teeth as a source of stem cells.
Design:

1. Isolation and culture of dental pulp cells from supernumerary teeth. Supernumerary and deciduous teeth were obtained after local anesthesia from four healthy children of 5–7 years of age at the same time.
2. Cell number counting and survival rate analysis
3. Colony Forming Unit-Fibroblast (CFU-F): Cells were incubated with primary antibodies in PBA CD29, CD34 and CD105.
4. Flow cytometry analysis
5. RT-PCR: One microliter of the RT product was mixed with 1 μL PCR primer (Table 1) and PCR Primix (Intron, Korea), and 30 PCR cycles were carried out according to the following program: 94°C for 30 s, 58°C for 30 s, and 72°C for 30 s.

Result: DPSCs, cells derived from deciduous and supernumerary teeth, have a spindle-shape and adhere to culture plates. The survival rate of such cells was approximately 98–99% during the culture period, and growth rates were similar in both cell populations. The CFU-F values of DPSCs were approximately 15–17% and did not vary between the two cell types. In addition, isolated DPSCs from deciduous or supernumerary teeth expressed three germ layer markers and MSC markers.
Conclusion: Stem cells from supernumerary teeth resemble those from deciduous teeth and have characteristics of MSCs. Thus, supernumerary teeth are able to act as a source of stem cells.

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Oral Session O12/Dental Trauma 2

O12-97

Apexogenesis of a severely intruded immature permanent maxillary central incisor: a 2-year follow-up case

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Introduction: Intrusive luxation in permanent dentition is relatively uncommon (0.3–1.9% of all traumatic injuries) and predominantly affects maxillary central incisors, due to their exposed location within the craniofacial complex. Depending on the extent of injury and root maturation, respectively, intrusive luxations require complex therapy and long-term follow-up, as well as joint effort and expertise of wide range of different specialities. There are several therapeutic approaches in treating intrusive luxations: watchful waiting for spontaneous re-eruption, surgical repositioning, orthodontic extrusion and the combination of the latter two.
Case report: We present a case of a 9-year-old girl who was treated for intrusive luxation of the immature permanent right maxillary central incisor following a roller accident. Initial radiograph showed a severely intruded central incisor, with an uncomplicated crown fracture and an open immature apex (>2 mm). After assessing clinical signs and symptoms, endodontic treatment was initiated 3 days later with LedermixPaste® (initially for 8 weeks, with three replacements in a 3-week interval) and $Ca(OH)_2$ placed monthly re-dressing thereafter. Immediate orthodontic extrusion was performed using a fixed appliance over 1 year period, after which the tooth was permanently restored with composite resin. Endodontic treatment was prolonged for another 6 months. During this 2-year period, regular clinical and radiographic reassessment was undertaken.
Conclusion: Since the prognosis was additionally complicated by a fistulated periapical infection and apexogenesis was achieved, it is these authors' conclusion that high pulp amputation, adequate endodontic treatment and immediate orthodontic repositioning led to satisfactory resolution in this case.

O12-98

Polish boxers level of knowledge concerning first-aid after dental injuries and their prevention

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Background: Sports injuries occur frequently. Fast sports with close body contact are particularly prone to face and teeth trauma. Box fight carries a high risk of dental injuries. Polish data are not available in this respect.
Aim: The aim of this survey was to establish the frequency of injuries, the habit of wearing mouthguards, as well as, the general level of knowledge concerning procedure after dental injury and the resulting consequences, by means of a questionnaire filled up during the interviews conducted with young amateur boxers.
Design: Three hundred and thirty-eight boxers from Polish teams were interviewed countrywide using a standardized questionnaire. The questions focused on the frequency of dental accidents, their prevention and subsequent procedures. The participating 338 boxers were classified in three age groups: schoolboys and juniors (155), youth (66) and elite (117). Mean age of study participants was 17.59 (SD = 3.30). All boxers have been trained already for 3.62 (SD = 2.88) years and 8.86 (4.28) h per week.
Results: Of the 338 interviewed persons 36% have already seen a dental trauma when practicing box and 26% witnessed it during tournament. Thirty-six percent of the interviewed boxers have already undergone a dental trauma. Forty-three percent of all interviewed boxers wore mouthguards and helmets during trainings and 93% of them wore it during tournament. Just 6% of boxers wore individual mouthguards. The awareness of the procedure following a dental trauma was unsatisfactory.
Conclusions: The results of the survey show that significantly more information and education is required for amateur boxers not only through sports associations, but also through coaches and dentists.

O12-99

Mineralization disturbances in permanent successors after trauma to primary teeth. Inter-observer agreement based on photographs

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Background: Trauma to primary teeth may cause mineralization disturbances in the permanent successors. Such developmental disturbances may, however, also be due to other insults.
Aim: To study inter-observer agreement using photographs to register mineralization disturbances in permanent teeth after trauma to primary teeth.
Design: All injuries to primary teeth were registered in children in one county of Norway in 2003. A total of 266 children (1–8 years of age) with injuries to 447 teeth were registered. During 2010 a follow-up was performed to record mineralization disturbances in permanent successors and in neighboring non-injured predecessors. Clinical examination and intraoral photographs were performed in 205 patients by the principal investigator (ABS). The photographs were evaluated twice for developmental disturbances by three pediatric dentists. In session 1, age and diagnoses at the time of injury were unknown, in session 2, this information was given. Inter-observer agreement was calculated using Cohen's kappa.
Results: Session 1: All three examiners registered trauma as the most likely explanation for the mineralization disturbances in 35% of the individuals, 15% as due to other causes, 10% were disputable and 40% sound or unreadable, κ 0.88–0.93. Session 2: Trauma was judged as most likely cause in 20% of the children, 16% due to other causes, 15% was disputable and 49% registered sound or unreadable, κ 0.70–0.87.
Conclusions: Recording mineralization disturbances in permanent teeth following trauma to the primary dentition is complex. Although the results revealed good agreement between the examiners, there was uncertainty in several cases.

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O12-100

Parental quality of life impacts associated with childhood dento-alveolar trauma

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Background: To date, the majority of studies that have investigated the impact of childhood dento-alveolar trauma have neglected to study the psychosocial impact of dental injuries on the family unit.
Aim: The aim of this longitudinal study was to investigate the impact of children's dental injuries on their parents and explore how demographic, clinical and psychosocial variables influence parental adaptation to dento-alveolar trauma over time.
Design: A total of 244 families attending a UK dental hospital for management of their child's traumatised permanent teeth were invited to participate. Clinical information relating to the child's dental injuries was collected from patient notes. Children's oral health-related quality of life (OHRQoL), parental satisfaction with dental care and parental impacts resulting from the dental injury were measured at baseline using self-report questionnaires. Parental quality of life impacts were assessed again at a 6-month follow-up. Lagged multiple regression analyses were conducted to investigate which demographic, clinical and psychosocial variables predicted parental quality of life outcomes at the 6-month follow-up.
Results: One hundred and thirteen parents participated in the baseline study (47% response rate) and 73 parents completed follow-up questionnaires (65% response rate). Parents reported most impacts on their emotional functioning as a result of their child's dental injury. Health care satisfaction and children's OHRQoL were the only significant predictors of parental health related quality of life at the 6-month follow-up.
Conclusions: The findings from the present study highlight the importance of the dental team in delivering a family-centred approach for the management of childhood dento-alveolar trauma.

O12-101

The antimicrobial effect of various root canal medicaments used in management of immature non vital anterior teeth.

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Aim: To evaluate the most effective intra canal medicament against five bacteria commonly implicated in causation of endodontic infections.
Methodology: Five bacteria, namely, *Actinomyces odontolyticus* (AO), *Porphyromonas gingivalis* (PG), *Escherichia coli* (EC), *Fusobacterium nucleatum* (FN) *Enterococcus faecalis* (EF), were selected for this study. The materials used were calcium hydroxide (CH), MTA and the recently advocated antibiotics (Minocycline, Metronidazole and Ciprofloxicillin), individually and as a Triple mixture. Aerobic bacteria were grown in BHI for 24 h and incubated at 37°C. Anaerobic bacteria were grown in BHI + M + H for 24 h and incubated in anaerobic cabinets with optical densities adjusted to 1×10^5. Inoculating 100 μL onto CBA plates, an area of 3 mm was cut in each plate to put the test material. Means of the inhibitor zone were measured by calliper gauge.
Results: CH, MTA and Metronidazole were not effective against *Enterococcus faecalis*; however Ciprofloxacin and Minocycline showed larger bacterial inhibitory zone with all types of bacteria used in this study. When all three antibiotics were used as a mixture, they were found to be effective against all bacteria in the study.
Conclusions: Under the conditions of this study triple antibiotic (TriBioDent) was effective against the common bacteria that cause endodontic lesions.

O12-102

Alveolar ridge preservation to facilitate future implant placement after early loss of incisor in an adolescent

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Introduction: Extraction of a tooth, especially in maxillary anterior region, results in ~50% reduction in ridge width. For implant placement, inadequate ridge volume frequently requires augmentation surgery, which is invasive, expensive and associated with a high morbidity. This report demonstrated how the ridge was preserved for an adolescent with an early loss of an incisor.
Case report: A 14-years-old boy had a traumatised maxillary-right-central-incisor, which developed extensive external root resorption. The tooth was unrestorable and needed to be extracted. In order to preserve the ridge, at the time of the extraction, deproteinised bovine bone mineral (Geistlich Bio-Oss) was placed in the extraction socket, protected by a porcine collagen barrier membrane (Geistlich Bio-Gide). A fibre-glass bridge was provided as a temporary aesthetic space maintainer. After 2 years, a CBCT scan confirmed that the ridge's height and width were preserved and implant placement could be carried out without ridge augmentation surgery.
Comments: Implant placement is not recommended until the growth of an individual is complete. Loss of ridge width is a complication in young people after extraction. Hence, it is beneficial to preserve the bone to avoid this additional surgical procedure. BioOss is a good bone substitute with osteoconductive property. When it is protected by the Bio-Gide membrane to prevent soft tissue ingress, alveolar bone resorption is minimized as demonstrated in this case report, after 2 years follow-up. This patient has now passed the rapid growth phase and the site is now ready for a replacement with an implant.

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Oral Session O13/Epidemiology – Public Health 1

O13-103

Risk factors related to tooth wear in 5–7 year- old children

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Background: Although there have been many studies concerning the prevalence of tooth wear in children, only a few have related tooth wear in deciduous dentition to possible causative factors.
Aim: To assess the distribution and severity of tooth wear in deciduous dentition, and to investigate the factors affecting the risk of its occurrence.
Design: A sample of 243 5–7-year-olds, living in the city of Piraeus were examined for tooth wear, using the TWI-index, which was also converted to meet the criteria of BEWE scale for the calculation of the cumulative BEWE-score. A questionnaire was completed by parents, about the exposure of the children to gastric acid reflux, use of acidic medicines, habits related to abrasion and patterns of consumption of acidic foods.
Results: Only 1.6% of the children were tooth-wear free, whereas 45.6% had moderate to severe tooth wear affecting dentine. Older children, boys, and immigrants had significantly higher probability to present tooth wear in dentine, in comparison with younger children, girls and Greeks (OR = 2.78, 1.72 and 1.93 respectively). After adjustment for age, gender and nationality, it was found that exposure to soft drinks and fresh fruits, as well as frequent consumption of salads significantly increased the odds of presence of tooth wear involving dentine (OR = 1.27, 1.05 and 2.06 respectively). Moreover, most of the risk factors assessed significantly predicted the BEWE-score ($P < 0.05$).
Conclusions: Tooth wear is a common condition in children, related to both the physiological process of ageing of dentition and the erosive effect of dietary factors, especially soft drinks consumption.

O13-104

Association between relative weight and dental health in 12-year-old Filipino students – findings from the national oral health survey 2006

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Background: Underweight and dental caries are very common among Filipino students. Association between relative weight and dental caries has not been studied in Filipino schoolchildren, yet.
Aim: The aims of this study were to analyze associations between relative weight and dental health in 12-year-old Filipino children.
Design: Dental and anthropometric examinations were conducted on 1951 12-year-old Filipino students during the cross-sectional National Oral Health Survey in 2006. Relative weight was assessed by body mass index and the evaluation with the CDC growth charts. Dental caries prevalence and severity were measured by DMFT index. Dentogenic infections (DI) were scored with PUFA index. Multivariable poisson regression models were applied to investigate the association of relative weight categories and dental health using normal relative weight as referent and adjusted for socio-demographic factors.
Results: The prevalence of underweight was 27.6%. Approximately 4% of the children were at risk for overweight or overweight. Caries prevalence was 78.2% and 50.6% of the children had DI. The mean DMFT was 2.9 and the mean PUFA was 1.0. Underweight children were more likely to have caries experience (RR 1.14, $P < 0.001$) and DI (RR 1.16, $P = 0.003$) than normal weight children. A lower probability for suffering from caries was found in children at risk for overweight (RR 0.75, $P < 0.003$) and overweight (RR 0.65, $P < 0.012$). Children with >3 siblings had an increase risk of caries experience (RR 1.09, $P = 0.002$).
Conclusion: Underweight children need specific attention to improve oral health in the Philippines.

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O13-105

Reporting and application of caries experience assessment in epidemiological surveys: a review

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Aim: To review methodological aspects of caries experience (CE) assessment in epidemiological surveys.
Design: A search of English language literature, published between January 2000 and December 2008, was undertaken using 'epidemiology, dental caries and assessment' as search terms. Information on criteria for CE assessment, materials and settings, training of examiners and validation of the screening results was extracted from the reports.
Results: Eighty-nine reports met the inclusion criteria. In nine of the reports (10.1%) no reference was made to existing standardisation criteria for CE assessment. Light condition applied 60 reports (67.4%) and use of instruments 60 reports (67.4%) were frequently reported. Most reports mentioned that training and calibration of examiners took place, but the outcome of reliability assessment was often not presented 48 reports (53.9%). Only 28 of the reports (31.5%) specified that cleaning took place before the examination. Journals with Impact Factor provided information on methodological aspects more frequently than journals without. The WHO Basic Methods for Oral Health Surveys were most often applied 52 surveys, (58.4%). However, deviations from the original description were found especially for assessment and reporting of reliability measurement [24 (46.2%) and 29 (55.8%) respectively], type of probe used [27 (51.9%)] and light condition [16 (30.8%)]. All of these hamper the (external) validity of the obtained results.
Conclusions: There is a clear need for improvement of the reporting and application of methodological aspects of CE assessment in epidemiological surveys. A check-list of methodological aspects to be included in reports of CE assessment surveys is proposed.

O13-106

Caries prevalence in Greek young children: social, biological and family related factors

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Background: Several models have been developed to explain caries prevalence, however practical models remain to be built especially for young children.
Aim: To (i) describe the socio-demographic profile as well as the oral health behavior of preschool children and their parents, (ii) investigate the impact of different factors on oral health, and (iii) compare models for caries risk assessment.
Design: The study population consisted of 1141 2–6 year-old children from public kindergartens in Attica, Greece. Parents completed a questionnaire investigating demographic and socio-economic factors, daily oral hygiene and dietary behaviour of their children and themselves. Clinical dental examination was performed by two calibrated paediatric dentists.
Results: It was found that 30% of the mothers and 27% of the fathers had completed higher education. Many of the children did not brush their teeth everyday while 1/3 did so without help. Only 38% of them had visited a dentist. Regarding the oral health behaviour of the parents, the majority of them brushed their teeth at least once per day and regularly visited a dentist. Regression analysis showed that the child's age, the mother's place of upbringing and her attitude to the importance of oral health, had a significant association with children's *dmft*. In a statistical model including only clinical parameters as independent variables, plaque index had a significant impact on *dmft*.
Conclusions: Family-related parameters, dietary habits and oral health behaviour had a significant impact on caries prevalence in preschoolers.
The study was supported by the Live-Learn-Laugh project of FDI, funded by AIM/Unilever.

O13-107

Caries risk assessment with Cariogram in Greek adolescents under orthodontic treatment

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Background: Orthodontic patients are at risk for developing caries and periodontal disease. Cariogram, as a caries prediction model, can be useful for the determination of the disease risk level.
Aim: To assess the caries risk profile of Greek adolescents under orthodontic treatment using the Cariogram.
Design: Sixty-six (66) 9–18 years old healthy orthodontic patients from the Postgraduate Paediatric Dental Clinic participated in the study. A questionnaire on general health and oral health behavior was completed. The study design included: a) collection of stimulated saliva sample for determination of MS and LB counts, salivary rate and pH (Ivoclar-Vivadent) and b) clinical assessment of DMFT index (WHO 1987), white spot lesions (WSL) on the buccal surfaces of maxillary teeth (Gorelick et al.1982), plaque and gingival index. The clinical examination was conducted by two trained and calibrated examiners. All data was entered into the Cariogram software and caries risk was calculated.
Results: From the orthodontic patients 59% had caries and 27% WSL. Poor oral hygiene was found in 55% and MS levels $\geq 10^6$ in 42% of the patients. Only 9% of the study group received more than five meals daily. The Cariogram revealed that 55% of the orthodontic patients had high, 20% medium and 25% low risk for caries development.
Conclusions: According to Cariogram, more than half of the orthodontic adolescents had a high caries risk while only 1/4 of the patients exhibited low caries risk.
The study is partially supported by Ivoclar-Vivadent, Lichtenstein.

O13-108

Early childhood caries (ECC) and associated factors in Attica preschool children, Greece

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Background: Early Childhood Caries is a multifactorial dental disease and a significant public health problem in preschool populations globally, involving mainly children from minorities and low socio-economic background.
Aim: The purpose of the study was to assess the prevalence of ECC in preschool children attending public kindergartens in Attica, Greece and to investigate the influence of certain socioeconomic biological, dietary and behavioral factors on its onset.
Design: A stratified random sample of 513 Greek and Immigrant children, aged 4–5 years old were examined at their school settings for dental caries and oral hygiene level, using dmfs and DI-s

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indices, while a questionnaire was completed by mothers at home. Each child was classified as caries- free, having ECC or S-ECC, according to the criteria set by the American Academy of Pediatric Dentistry. Descriptive statistics were generated and multivariate analysis of related factors was used to test significant associations.
Results: ECC prevalence was 21.6% in the total sample, 16.32% among Greeks and 54.16% among immigrants. S-ECC was found in the 12.7% of the sample. Statistical analysis revealed significant correlations of ECC with most of the variables checked, especially, immigrant background ($P = 0.004$), poor oral hygiene level ($P = 0.009$), prolonged breastfeeding ($P = 0.007$), use of baby bottle at bedtime ($P = 0.015$), no use of dental insurance ($P = 0.003$), first dental visit due to dental treatment ($P = 0.002$) and mother's dental visits for treatment or pain ($P = 0.002$).
Conclusions: Caries prevalence in preschool children has declined compared to that previously reported in Attica, Greece; yet, oral health disparities do exist between children of Greek and immigrant background.

O13-109

School-based oral health promotion programme for adolescents

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Background: Schools are considered appropriate environment for health promotion for children, since they provide support for improving health, self-esteem, behaviours and skills.
Aim: Main goal was to implement The Programme of oral health promotion in schools and connect regular science curriculum with oral health education. Programme was focused on improvement of adolescents' periodontal health and oral health related knowledge, attitudes and behavior.
Design: Programme was developed to be used by teachers with 15–16 years olds in secondary schools. It was integrated into biological sciences curriculum using three 45 min sessions over 3 weeks. Each session involved a class experiment in pairs (plaque disclosure and brushing teeth, practicing flossing) and key lesson based on a slide presentation. The content of the programme rests on self-care. Other concepts include the nature of bacterial plaque, the causes of decay and gum diseases and the importance of frequency of sugar consumption. Emphasis was placed on developing and improving brushing and flossing skills.
A random pretest and post-test study design was implemented to evaluate effects on adolescents oral health. In group of 180 adolescents DMF score, Gingival Index (Silness-Löe) and Turesky modification of Quigley-Hein Plaque Index (TPI) were recorded before and 1 month after Programme was implemented. Follow-up will be conducted after 1 year.
Results: Plaque and gingival scores decreased 1 month after Programme had finished ($TPI_0 = 2.15 \pm 0.70$; $TPI_1 = 1.44 \pm 0.57$; $GI_0 = 0.66 \pm 0.36$; $GI_1 = 0.12 \pm 0.15$).
Conclusions: Short-term evaluation showed that Programme improved plaque removal efficiency and gingival health.

O13-110

Effectiveness of a preventive program for high caries risk preschool children – 1 year results

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Background: Although prevention of early childhood caries is very important, there are not many preventive programs for high caries risk preschool children.
Aim: To evaluate the application of a preventive program for high caries risk children, after 1 year.
Design: In this randomized, double blind, controlled trial, 408 children (mean age 3.4 years, SD = 0.86) were randomly allocated in two groups. All children received oral health education and brushed their teeth daily at school, under supervision, with 1000 ppm fluoride toothpaste. Children in the test group received biannual application of fluoride varnish (Fluor-protector) and in the control group a placebo varnish. Children were examined for cavitated and white spot lesions (WSL), and the visible plaque index (VPI) was used to assess the oral hygiene level.
Results: After 1 year, 342 children were available for examination. Between the two groups there were not statistically significant differences at baseline characteristics. The 1 year incidence for the dmfs (cavitated lesions + WSL) was 2.12 (SD = 4.47) and 2.28 (SD = 4.65) and for the WSL 0.34 (SD = 1.53) and 0.58 (SD = 2.03) for the test and control group respectively. The differences between the two groups were not statistically significant ($P = 0.7$ for dmfs, $P = 0.2$ for WSL). There was a significant reduction of the VPI from baseline for the control and the test groups ($P = 0.02$ & $P = 0.001$) but not between them ($P = 0.4$).
Conclusions: There was no significant difference of caries incidence between the two groups with the application of the preventive program; however, the systematic tooth brushing resulted in significant reduction of dental plaque.
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O13-111

Nutrition status and dental caries prevalence in Brazilian 2–4 year-old children

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Background: Findings on the relationship between nutrition status and caries are equivocal and there are few published population studies that have investigated the association between nutrition status and dental caries in preschool children.
Aim: To assess whether dental caries was related to nutrition status in Brazilian preschool children.
Design: Data were from 765 2–4-year-old children attending a statutory National Day of Children's Vaccination in Macapá (Northern Brazil). The survey included a parental questionnaire and children's anthropometric assessment (height and weight) and oral clinical examination (dental plaque and caries levels). The questionnaire collected information on family socio-economic (parental education and household ownership and overcrowding) and children's demographic factors. The WHO Child Growth Standards reference was used to calculate Weight-for-Age (WAZ), Height-for-Age (HAZ), Weight-for-Height (WHZ) and BMI-for-Age Z-scores (BAZ). Dental caries was recorded at surface level according to the WHO diagnostic criteria and the dmfs index was calculated as the sum of decayed, missing and filled tooth surfaces. Logistic regression was used to test the unadjusted and adjusted associations of each Z-score index with dmfs.
Results: 62.3% of children had dental caries, with a mean dmfs of 4.92 (SD: 6.56). In the unadjusted models, children with a BAZ-score > +2 and WHZ-score > +2 had 46% and 37% lower rates for dmfs compared to normal children (−2 > =Z-score > = +2). However, these associations were fully attenuated after adjustments for socio-demographic factors and dental plaque.
Conclusion: Nutrition status was not related to dental caries in preschool children when other established determinants of dental caries were taken into account.

O13-112

Associations between dental caries and family size in a low-income program

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Research supported by the University of Washington, School of Dentistry Research Fund through the 2009 School of Dentistry Research Grant
Purpose: To determine the association between the number of caries lesions and the family size of toddlers and infants in Early Head Start (EHS), a low-income program.
Design: Children (aged 6–36 months) and their parents/caregivers (n = 152 dyads) enrolled in EHS in Seattle, WA participated in this cross-sectional study (2009–2010). Information on knowledge, attitudes and behaviors towards oral health as well as demographic data, including family size, were collected from parents/caregivers by a self-administered questionnaire. One calibrated examiner using the World Health Organization diagnostic criteria measured dental caries. Caries prevalence and mean dmfs were calculated. A one-way ANOVA was performed to determine association between caries experience (dmfs) in children enrolled in EHS and the number of children per family ($P < 0.05$).
Results: Prevalence of dental caries was 20.39% and mean dmfs was 1.24 (SD: 4.99). There was no significant association between caries experience and the number of children per family [F (2,146) = 0.47, P = 0.62]. Only two-thirds of the parents reported that their child's teeth get brushed twice a day. In addition, 8% of the children experienced dental pain in the past and only 64% had a dental exam prior to this study.
Conclusions: Dental caries and number of children per household has been associated in the literature. For this study, caries experience does not appear to differ by family size. Longitudinal studies to evaluate the likelihood of the incidence of caries lesions in large families will generate more accurate data to be used in Caries Risk Assessment tools.

O13-113

Effective dose estimation in conventional and digital intraoral radiography

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Aim: The purpose of this study was to estimate the effective radiation dose at preselected anatomic sites of the maxillofacial complex, using three different exposure time settings, corresponding to conventional, digital/charge-coupled device (CCD) and digital/phosphor storage plate (PSP) radiography.
Design: A tissue-equivalent Rando phantom was used for the measurements. Full mouth examinations and individual teeth exposures using the three radiographic techniques and the bisecting angle technique were performed. The absorbed doses were measured using thermoluminescent dosimeters TLD-100 chips, placed at anatomic sites, corresponding to: thyroid gland, submandibular and sublingual glands, eyes, parotid glands, temporomandibular joint and bone marrow. Total effective doses were estimated according to ICRP 2007 recommendations.
Results: Full-mouth examination required 14 conventional films, 14 digital PSP and 21 digital CCD exposures. Mean absorbed doses ranged from 0.04 to 3.08 mGy for the conventional technique, 0.21–2.04 mGy for the digital CCD and 0.05–1.80 mGy for the digital PSP technique. The highest mean doses were recorded at the bone marrow (3.08 mGy) and the lowest mean doses at the TMJ (0.04 mGy). Total effective doses were 0.12 mSv for the full-mouth conventional technique, 0.10 mSv for the full-mouth CCD and PSP techniques, 0.057 mSv for the individual conventional and 0.049 for the individual CCD exposures.
Conclusions: Although the digital full-mouth examination may require an increased number of exposures, effective dose is lower in digital radiography than in conventional one, both in full-mouth examinations and in individual radiographs. Dose estimations depend on many factors, such as time settings, film/sensor/plate size, number of exposures and retakes, x-ray machine properties.

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Oral Session O14/Dental Anxiety and Behaviour Management 2 – Education

O14-114

Advances in paediatric dentistry: clinical study of high speed versus laser caries treatment in split mouth design

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Background: Due to dental anxiety, a high percentage of dental decay is still not restored in early childhood.
Aim: Evaluation of the interdisciplinary treatment concept regarding the acceptance and compliance by children.
Design: The Laserkids® concept (Schindler Master's thesis RWTH Aachen 2008) was developed as an interdisciplinary guideline for laser-assisted paediatric dentistry consisting of four main pillars: setting, desensitizing, behavioral management, and pediatric laser parameters and procedures. The acceptance of the Laserkids® concept by children was evaluated in a second investigation carried out on 30 children aged 3–12 years, of which 15 were treated according to the Laserkids® concept. Noise, taste/smell, rumbling/tickling, water, cold feeling and pain were examined. Er,Cr:YSGG laser (2780 nm) cavity preparation was compared to high speed in split mouth design. The statistical analysis of the study was done with Student's *t*-test at a significance level of $P < 0.05$.
Results: The acceptance rate of the laser treatment was significantly higher than that of the high speed treatment ($P < 0.001$) and higher in the Laserkids® group ($P < 0.05$). Over 85% had no pain or only little pain during laser treatment (80% of the control group, 93% of the Laserkids® group) and over 96% of all examined children would prefer laser preparation for further caries therapy.
Conclusions: In paediatric dentistry laser-assisted therapy has significant benefits compared to conventional treatment methods. In combination with an interdisciplinary approach, the acceptance of the children is high.

O14-115

Validating a modified dental discomfort questionnaire for measurement of dental pain in young children

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Background: Clinicians and caregivers endeavor to reliably assess dental pain in young children.
Aim: This study validated a modified Dental Discomfort Questionnaire (DDQ) as a tool for assessment of dental pain in this population.
Design: Caregivers of 146 children under 7 years old completed a modified DDQ at Days 1 and 2–4 after their child's oral rehabilitation under general anesthesia. This instrument contained three questions about toothache and eight items connected to 'mouth-related behaviours' (chewing, toothbrushing, food choices). Three answers were possible: 0-never, 1-sometimes, 2-often (total score range = 0–22). Principal Component Analysis (PCA) with varimax rotation, Cronbach's alpha coefficient and Receiver Operating Characteristic (ROC) Curve were used to validate the instrument in our analysis.
Results: At Days 1 and 2–4 post-operatively, 52.1% and 41.2% of children respectively were reported to have some oral pain. At Day 1, PCA identified four factors (pain, brushing/chewing problems, problems biting/chewing, eating discomfort); two factors including eight items generated a reliable (α 0.79 and 0.71) and discriminated (ROC curve area 0.80; 95% CI 0.72; 0.88) model, but with a cutoff value of 0.5. For Day 2–4, PCA identified three factors which included all 11 DDQ items: α 0.84, 0.91, 0.67 (ROC curve area 0.85; 95% CI 0.79; 0.92), generating a model with a cutoff value of 1.5. Thus, our modified 11-item DDQ correctly identified 83.0% of children with pain; only 20.0% of children without pain were incorrectly identified.
Conclusions: The modified DDQ is valid for identifying postoperative dental pain in young children after comprehensive oral rehabilitation.

O14-116

The Wand single tooth anaesthesia (STA) for dental treatment of young patients under intravenous sedation. (A case series)

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Background: Intravenous sedation (IVS) has been available for dental treatment of young patients at King's College Hospital for 4 years. Anxiety associated with local anaesthetic (LA) injections can be a significant impediment to paediatric dentistry. The Wand STA, a computerised LA delivery system, has been used in the department of Paediatric Dentistry since September 2009 as an alternative to the conventional dental LA syringe to help reduce pain and anxiety during intra-oral injections by maintaining constant pressure and volume ratios.
Aim: To assess patients' reaction to LA using the Wand STA for dental treatment under IVS.
Design: The operator (LLM) was trained in the use of the Wand STA. During 6 months, all consecutive patients allocated to have dental treatment under IVS had LA administered by the Wand after topical use of 20% benzocaine. Patients' reaction was recorded by the dentist and scored as: no, slight, moderate, and severe. The teeth and type of treatment were recorded.
Results: A total of 100 children, 55 girls, aged from seven to 16 years (mean age 12.7 ± 1) were included in this case series. Eighty eight children (88%) showed no reaction, eight (8%) a slight reaction, four (4%) moderate reaction, while none were scored as severe. Thirty-seven percent were mandibular infiltrations, 40% maxillary, and 23% were administered into both arches.
Conclusions: The majority of patients showed no untoward reaction. The operator found it easier to eliminate the visual stimulus of the needle. The Wand STA is useful for dental treatment of young patients under IVS.

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O14-117

Indicators of dental anxiety in children just prior to treatment

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Background: Anxiety is often a major challenge to providing oral health care to children. Identifying indicators that may predict dental anxiety could improve the delivery of care.
Aim: To evaluate the relationship between dental anxiety in pediatric patients and selected traits of the patient and parent.
Design: The sample was 118 children, 6–14 years who attended the NYU Pediatric Dentistry Clinic. The Children's Fear Survey Schedule – Dental Subscale (CFSS-DS) was used to evaluate each child's self-reported anxiety related to dental treatment. The Modified Dental Anxiety Scale (MDAS) was administered to the child's accompanying parent in order to measure parental anxiety about their own previous dental treatment.
Results: Bivariate analyses of CFSS-DS data revealed significantly higher anxiety in girls than in boys, regardless of age. MDAS scores were correlated with CFSS-DS scores and were modestly stronger for boys than girls. Linear regression using CFSS-DS scores as the outcome variable and gender, age, and MDAS scores as independent variables, revealed that gender and increasing age were inversely related to CFSS-DS scores while increasing MDAS scores were positively related to CFSS-DS scores; however, only gender and MDAS scores were statistically significant indicators at the $P < 0.05$ level.
Conclusions: Girls expressed higher levels of fear related to dental treatment. Also, parental anxiety about their own dental treatment was an indicator of higher child anxiety. Awareness of these indicators for increased anxiety can help the provider decide which behavior guidance techniques would be best suited for an individual patient.

O14-118

A report on undergraduate student anxiety and concerns regarding clinical dentistry

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Background: Paediatric Dentistry undergraduate teaching at King's includes the clinical management of high caries risk children in 4th and 5th year. Students may be apprehensive of carrying out operative treatment, especially since few have personal experience of child management. As part of curriculum development we are monitoring the student experience.
Aim: To report students' own anxiety when receiving treatment and their concerns when treating children compared to adults.
Design: In February 2011, for 2 weeks, 4th and 5th year students firstly completed a self-report questionnaire to assess their own anxiety while receiving dental treatment using the Modified Dental Anxiety Scale (MDAS). Secondly, using a Visual Analogue Scale (VAS) where 10 = 'apprehensive', they recorded their apprehension when delivering dental treatment to children and adults.
Results: There were 266 (80% return) fully completed questionnaires; 137 were 4th years (58 males) and 129 were 5th years (51 males); 200 students (76%) were aged between 20 and 24 years. Student's dental anxiety when receiving treatment was low [MDAS mean 8.9, 95% CI 0.4]. On delivering dental treatment, students reported that they were more apprehensive treating children compared to adults [VAS: adult mean 1.7 95%CI = 0.3; child mean 4.0 95%CI = 0.3; paired t-Test- one tail $P = 0.01$, two tail $P = 0.03$]. There was no difference attributable to student gender [t-Test $P = 0.410$). Main concerns were giving local anaesthesia, performing pulpotomies, and trauma and emergency management.
Conclusions: Students reported low anxiety when receiving treatment. They reported being more apprehensive treating children compared to adults.

O14-119

Oral transmucosal midazolam: a safe and effective method of conscious sedation in young children

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Background: Children < 4 years of age have not yet developed the ability to comprehend complicated instructions and therefore, pharmacotherapeutic means of behavior management are generally required. Conscious sedation using different drugs via non invasive routes is a safe and commonly used anxiety control method in pediatric dentistry which is now being preferred by pediatric dentists the world over.
Aim: The aim of this double blind study was to test the efficacy of oral-transmucosal midazolam in a dose of 0.5 mg/kg BW for carrying out class II restorative procedure in young children up to 4 years of age.
Design: A total of 40 children up to 4 years of age with no previous dental experience and non-exposed proximal carious lesions in primary mandibular molars were selected from the Out Patient Department of Oral Health Sciences Centre, Post Graduate Institute of Medical Education and Research, Chandigarh. Baseline anxiety levels were evaluated using Venham's clinical anxiety scale and Frankl scale and children were randomly allocated to two Groups (Group I-experimental, Group II-control). On the day of the appointment, a single blinded observer administered either a mixture of strawberry syrup with midazolam 0.5 mg/kg BW (experimental group) or strawberry syrup mixed with saline (control group) to all children with a spoon in small increments to prolong contact with the mucosa. Routine behavior management techniques were used in both groups during the restorative procedure which was performed by a single investigator. The parameters evaluated were: Acceptability of the drug, sedation depth, anxiety levels at each step of the restorative procedure and total treatment time.
Results: Baseline anxiety levels were well matched in both groups with most children displaying a negative behavior. Eighty percent children in Group I and 70% in Group II accepted the test solution readily. The sedation depth achieved with midazolam was of mild degree with children being calm or slightly drowsy. The anxiety levels remained significantly lower in group I for all treatment steps except rubber dam application. The overall treatment time taken to complete treatment was 25.88 7.56 min in Group I and 35.71 15.16 in Group II ($P < 0.05$).

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O14-120

The singing dental drill and the finger dental drill.An innovative approach in dealing with dental anxiety

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Background: Anxiety during dental visit is common between children but fundamentally, they are more anxious towards the dental instruments than towards to the dentist. A lot of measures have been introduced to manage dental anxiety, pharmacologically or non-pharmacologically. Among the non-aversive methods, audiovisual distractions, and brief relaxation techniques are the most useful methods. One of the main sources of anxiousness among children is dental drill. Although improvements have been done by the manufacturer to make the dental turbine handpiece quieter but noise is still there.
Aim: The aim of this paper is to introduce two types of dental drill, the singing dental drill and the finger dental drill that has been modified as a solution to children's dental anxiety. Singing dental drill is a handpiece modification that incorporates music distraction, inexpensive, easy to install, does not obstruct dentist working area or vision (e.g. the use of headphones or head mounted displays) and also doesnot interfere dentist-patient communication (e.g. earphones). These qualities would be a pleasant surprise for both anxious and non-anxious patients which lead to a measure of control. Finger Dental Drill (FDD), a dental drill with a different way of operation was compared to ordinary dental drill. Ordinary dental drill was held by grasping the drill just like grasping a ballpoint, however, FDD is not held but by placing the body of the drill into the finger. FDD was invented to prevent the anxious children from noticing the drill so that the dentist can easily treat the tooth. As an addition, FDD can be used to treat the difficult area of a tooth such as second molars.

O14-121

Stress indicators and behaviour manifestation in children during consequent sessions of dental treatment

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Background: Stress evaluation can be based on measurements of psychosomatic indicators i.e. heart pulse rate (HR), salivary alpha amylase activity (SA) and behaviour manifestation. It is expected that consequent uncomplicated restorative dental treatment sessions assist child's familiarization to the dental environment and reduce stress.
Aim: To assess the pattern of changes of SA, HR, and behaviour manifestation in children receiving dental treatment under local anaesthesia (LA) for four consequent dental sessions.
Design: Thirty children with no dental treatment experience had to be treated under LA in four consequent sessions. On each session SA, HR and behaviour manifestation were determined before and during the LA application as well as at the end of each dental session. SA was detected enzymatically, HR was recorded with a pulse-oxymeter, and behaviour manifestation was evaluated by two observers using the Frankl scale.
Results: For each session, SA was always high at the end of the session. The overall SA was lower only at the fourth session. For each session, HR was always high during the LA. The overall HR showed no change between the sessions. Most of the children showed a cooperative behaviour. The behaviour did not correlate with SA or HR.
Conclusions: While SA may indicate some familiarization to dental treatment after three sessions, the other indicators, HR and behaviour manifestation, showed no change in stress reduction.

O14-122

Undergraduate experience and self perception of competency in placing preformed metal crowns

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Background: The Hall technique, a method of placing preformed metal crowns (PMC) without the need for local anaesthesia, was introduced to the undergraduate curriculum in 2009. The non-invasive nature of this technique has allowed PMCs to be placed in children where conventional preparation would not have been accepted.
Aim: To explore undergraduate exposure to, and self-assessed competency in, placement of PMCs prior to and following the introduction of the Hall technique to the curriculum.
Design: Retrospective data collection.
Methods: Data were extracted from validated student logbooks to extrapolate actual numbers of PMCs placed for cohorts graduating in 2005 ($n = 53$), 2009 ($n = 61$) and 2010 ($n = 75$). Recent graduates were also asked to complete a questionnaire detailing their self-assessed competency in PMC placement, using a 10 cm visual analogue scale (VAS): where 0 = not at all confident and 10 = very confident.
Results: Students graduating in 2005, 2009 and 2010 had placed a mean (range) of 0.03 (0–1), 0.63 (0–5) and 1.15 (0–9) PMCs respectively. Differences between year groups were statistically significant ($P < 0.05$, ANOVA). Only one (1.9%) 2005 graduate had actually placed a PMC. This figure rose to 59% ($n = 36$) for 2009 graduates and 75% ($n = 56$) for those graduating in 2010. Fifty graduates from 2010 also completed a self-report questionnaire and their mean VAS for perceived competency in PMC placement was 6.9 (range = 1.4–10).
Conclusions: Student exposure to placement of PMCs has increased dramatically since the advent of the Hall technique, with students reporting a reasonable level of competency in this treatment modality.

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O14-123

Dental undergraduate perspectives on preformed metal crowns and the hall technique

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Aim: To explore experiences and attitudes of dental students on the use of preformed metal crowns (PMCs) for children, following the introduction of the Hall Technique to the undergraduate curriculum. The Hall Technique obviates the use of local anaesthetic and tooth preparation, thus presenting significant advantages for use in young patients.
Design: Focus group discussions. A series of focus groups were conducted with 29 final year dental students in a UK dental school. A topic guide, developed from a review of the literature, provided a structure and basis for the discussions. All interviews were digitally recorded and transcribed verbatim. Data were then analyzed using an inductive process to identify key themes.
Results: Recurring themes identified from the narratives included: personal experiences of providing restorative dental care for young patients; the perception of how PMCs are viewed by children and parents; and perceived barriers to the use of PMCs in general dental practice. Students reported mainly positive experiences of the Hall Technique, with some expressing an intention to use it after graduation from dental school. However, concern over a lack of clinical support during foundation training, an anticipated increase in time and financial pressures, and the ease of use of glass-ionomer cement as an alternative, were described. Good communication and the need to involve parents and children in the decision-making process were also identified as important factors.
Conclusions: The findings suggest that final year dental students perceived the Hall Technique as an acceptable treatment modality for restoring carious primary teeth.

O14-124

Interpretive bias in clinical trials in paediatric dentistry

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Background: Interpretive bias (IB) occurs when a clinical trial is incorrectly interpreted, with authors claiming results that are not supported by the statistical analysis. IB has been shown in the field of medicine, but has not been investigated in paediatric dentistry.
Aim: (i) To evaluate whether there is IB in clinical trials in paediatric dentistry, and (ii) to evaluate the actual effect, magnitude of such interpretive bias.
Design: This systematic review was carried out in two parts. The first stage was to identify clinical trials, with IB, published from 2004 to 2009 search using ovid MEDLINE data base. The second part evaluated the influence of IB, by searching Web of Science database to determine the number of times these articles with bias were cited, and whether the authors quoted the incorrectly interpreted articles.
Results: The first part identified 14 out of 63 articles with IB (18%). The second stage identified the articles with IB were cited in a range of journals up to 14 times. In these citation studies, some authors cited an article with IB to support their methodology or results, while others pointed out its mis-interpretation.
Conclusion: This study demonstrated that IB occurs in clinical trials in paediatric dentistry. These articles are used in further studies, thus propagating the bias. This has implications for evidence based dentistry and best practice, as an incorrect method or technique may be recommended without merit. Journals need to ensure that peer review of articles is aware of IB.

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Oral Session O15/Public Health 2

O15-125

Can the child perception questionnaire be used as a 'scale'?

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Background: Lately there has been considerable interest in assessing the impact of children's oral health on quality of life (OHQoL). Child Perception Questionnaire (CPQ) is the most widely employed OHQoL CPQ was developed and evaluated using statistical procedures that are considered exponents of Classical Test Theory (CTT) but since there are conceptual limitations it cannot be assumed that CPQ or any short forms can be employed as scales.
Aim: To compare the original CPQ and four short versions of it using RASCH requirements
Methods: Data on child OHQoL was collected using the original 37-item CPQ 506 12-year-olds in Hong Kong. RASCH analysis using Winsteps software was used to create a short form of CPQ. The original CPQ and its four short forms (ISF-16, RSF-16, ISF-8 and RSF-8) were compared for RASCH requirements.
Results: RASCH analysis resulted in a 23-item short form of CPQ (RASCH-23). All short forms showed similar characteristics under CTT requirements: item-total correlation ranged from 0.29 to 0.87 for ISF-16, 0.29–0.87 for RSF-16, 0.25–0.46 for both ISF-8 & RSF-8, and 0.22–0.64 for RASCH-23, while reliability ranged 0.52–0.78 for both ISF-16 & RSF-16, 0.39–0.63 for both ISF-8 & RSF-8, and 0.53–0.79 for Rasch-23. However, the CPQ-16 and CPQ-8 failed to meet the goodness-of-fit criteria of RASCH modelling.
Conclusions: The original CPQ as well as its four short forms meet most of the requirements of RASCH modelling acceptably such that they can be considered as 'scales'. The short form of CPQ developed through RASCH analyses satisfied the criteria of CCT

O15-126

Primary preventive model on oral health for rural India utilizing existing health and educational infrastructure: a 19 years study

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Background: In a developing country like India, the oral disease burden is huge. Provision of curative services to the population is not feasible due to manifold factors. Thus, preventive and promotive services is a feasible approach to tackle this disease burden.
Aim: The aim of the project was to develop a model on oral health for rural India utilizing existing health and educational Infrastructure.
Design: An task force project was started in 1985 covering a population of 120 000 of Raipur Rani Block of Haryana, India to study the feasibility of implementation of oral health education in the community and school children by trained health workers and school teachers. The project staff trained the existing health workers, health assistants, multipurpose workers of CHC of the experimental area in primary preventive strategies of oral health. The staff was withdrawn from the field area in 1990 and subsequently the health workers were made responsible for delivering lectures to community on a routine basis. KAP and Snyder test are the main evaluation parameters recorded to study the effectiveness of the programme, these were recorded initially in 1986 at the baseline, and than re-recorded after 6 and 19 years of implementation of the programme.
Results: The results of the programme revealed an increase in percentage of community using brush from 36% at baseline to 87% after 6 years and further to 93% after 19 years during this period. The use of fluoride tooth paste also increased from 2% at baseline to 61% after 3 years of implementation and decreased slightly to 54% after 19 years.
Conclusion: The preventive approach to oral health is a feasible and cheaper approach to reduce the burden of oral diseases in developing nations like India.

O15-127

A preventive program for oral health in 0–2-year old Thuringian children, Germany

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Background: Early Childhood Caries (ECC) is most common infectious disease in childhood and affects children's growth. In cooperation of the Department of Preventive and Paediatric Dentistry (DPPD) and Youth Welfare Office (YWO) of Jena, Thuringia, a preventive program was initiated in 2009.
Aim: Purpose of this intersectoral program was the implementation of evidence based preventive and intervention strategies for early ECC onset.
Design: Trained staff of YWO visited all parents of newborns. Parents were advised about oral hygiene including practical tooth brush training, diet, use of fluorides, infectious etiology of ECC and the importance of the first dental visit after tooth eruption. In the first year of life the children were invited by YWO to dental examination and counselling in the DPPD. Initial caries progression lesions were treated by fluoride varnish application (Fluoridin N5; VOCO GmbH, Germany). Children were included in a risk related recall system.
Results: From the 416 children which were examined, 29.3% of the children showed an increased caries risk (28 children with general disease, 23 children with familial ECC burden, 71 children with drinking habits with breast/bottle feeding >3 times/night). Twenty children revealed initial carious lesions and three children caries.
Conclusions: Early dental visits and a closed intersectoral cooperation are essential for an effective ECC prevention.

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O15-128

Prevalence and intensity of dental caries in permanent teeth of children, living in the area of endemic fluorosis

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Background: Some studies and our observations have shown caries decay in permanent teeth of children with fluorosis.
Aim: To study the prevalence and the intensity of dental caries in permanent teeth of children, living in the area of endemic fluorosis.
Design: Ethical approval was granted from Ethics Committee MSMSU. A random sample was selected of 150 children, aged 6–15 years of age, living in the area which contained high concentration of fluoride in water supply (Moscow Region, Odintsovo). Fluoride concentration for this city was 3.5 mg/L. All children were examined for fluorosis and for caries by two trained and calibrated examiners. All children were divided into two groups: children with fluorosis (83 subjects) and children without fluorosis (67 subjects).
Results: Examination of 150 children, aged 6–15 years revealed the prevalence of fluorosis was 55%. The prevalence of caries decay in permanent teeth of all examinated children was 75%.The prevalence of tooth decay of children in the first group was 52%.Caries DMFT was 2.0 ($D = 128$, $M = 0$, $F = 39$). It was revealed tooth decay more frequently have been observed in the permanent molars. Caries localized on the occlusal, vestibular surfaces and also on the crown tubercles. The prevalence of tooth decay of children in the second group was higher – 52%. Caries DMFT was 3.7 ($D = 168$, $M = 0$, $F = 83$).
Conclusions: Prevalence of dental caries in permanent teeth of children, living in the area of endemic fluorosis was high. Children with fluorosis had low caries experience compared with children without fluorosis.

O15-129

Predictors of oral health related quality of life in Thai 10–12 year old children over time

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Background: Oral health related quality of life (OHRQoL) is the outcome of choice for dental care but earlier research has suggested OHRQoL is determined as much by psychological factors as clinical status in children. One potential psychological factor is Sense of Coherence (SOC): the extent to which one perceives the world as more comprehensible, meaningful and manageable.
Aim: To examine key clinical and psychosocial factors influencing OHRQoL in children.
Design: Clinical and questionnaire 3 month cohort study with 257 Thai students aged 10–12 years. Data included baseline socio-economic status (parent's education, occupation and income) and clinical status, and sense of coherence (SOC) and OHRQoL at baseline and follow-up.
Results: The data were analyzed using structural equation modeling (AMOS 7.0). The model was an excellent fit to the data [χ^2/df = 0.988, CFI = 1.000, RMSEA = 0.000 (90% CIs 0.000–0.046)] and indicated that baseline SOC had a direct effect on symptoms ($\beta = -0.143$, $P < 0.05$) and an indirect effect on functional limitations (via symptoms) at follow-up ($\beta = -0.157$, $P < 0.01$). Children with greater SOC reported fewer symptoms and less functional, emotional and social well being oral health impacts on daily life 3 months later. Caries levels and family socio-economic status did not significantly influence OHRQoL over time.
Conclusions: Children's beliefs about themselves and the world reduce oral health symptoms and enhance their quality of life independently of family environment and clinical status. Sense of coherence presents a possible avenue for oral health promotion interventions.

O15-130

Evaluation of the preventive program 'Healthy Smile' after 4 and 8 years of realization

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Background: School based preventive programmes (SBPPs) are considered as significantly promoting primary oral health care in children.
Aim: To assess the efficacy of two SBPPs after 4 and 8 years of their implementation.
Design: Dental status has been checked-up in 150 10–11-year old children in three elementary schools in Hradec Kralove. *School A* – 'Healthy Smile' (OrH education and training, topical fluoridation), *School B* – 'Healthy Teeth' (OrH education), *School C* – no SBPP (control). Inclusion criteria: informed consent, no systemic disease. Dental status was examined according to the WHO methodology (1997) in 2005 (after 4 years) and in 2009 (after 8 years of SBPPs set up). Calculated parameters: percentage of caries free children, DMFT, DT and RI. Indices Statistics: SPSS Advanced statistics; χ^2 test ($P < 0.05$).
Results: Mean DMFT has been found significantly lower in school A compared to B (1.1 *vs* 1.88 in 2005, 2.24 *vs* 3.76 in 2009. No significant difference in DMFT has been found between school B and control. Mean FT in children from school A was significantly lower in both 2005 and 2009 when compared with school B and C. Significantly more caries free children were seen in School A than in schools B and C (44.5 *vs* 28.6 *vs* 24.0 (2005), 48.0 *vs* 16.0 *vs* 22.6 (2009), respectively. No significant difference in restorative index was found among schools.
Conclusions: Our results stress the importance of completing theoretical education in OrH by practical training of tooth brushing and fluoride application.
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O15-131

Relative contribution of fluoride from drinking water, ingested toothpaste and dietary sources, in 4–5 year-old children in Selangor, Malaysia

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Background: There has been little data on the relative contributory roles of various sources of fluoride exposures in individuals.
Aim: The aim of this study was to determine the main sources of fluoride exposure in 4–5 year-old children residing in a fluoridated area in Selangor, Malaysia.
Design: Two hundred 4–5 year old subjects were sampled for biochemical determinations. From these, 181 provided 24-h urine specimens, 174 toothpaste specimens (dispensed for use and residual on toothbrushes) with corresponding expectorated rinses-while 178 sets of drinking water specimens were obtained. The 24-h urinary fluoride data and the fractional urinary fluoride of 30% were used to derive total fluoride intake. Data were analyzable for dietary fluoride by back calculation for a final 118 subjects.
Results: From the 181 24-h urine specimens, the mean daily total fluoride intake was 1424.4 μg. The amount of fluoride derived from drinking water in the 178 sets of drinking water data was 726.7 μg. The mean daily amount of fluoride derived from ingested toothpaste in the 174 respondents who provided toothpaste specimens was 213.5 μg. The mean fluoride intake from various sources in the 118 subjects that had a complete analyzable data set, were correspondingly 1749.3, 628.8 and 179.8 μg. By back calculation the daily dietary fluoride was 937.6 μg.
Conclusions: Relative contribution of fluoride from drinking water, ingested toothpaste and dietary sources are 35.9%, 10.3% and 53.6% in 4–5 year-old children in Selangor, Malaysia. The significance of these to subsequent development of fluorosis should be the focus of future research.

O15-132

Measuring parent's quality of life of children with dental caries and traumatic dental injuries

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Background: Presence of oral diseases and disorders in children can produce an impact not only on their quality of life (QoL), but also on their parents. Family income could confound this association, but it has not been yet tested.
Aim: To assess the impact of children's Dental Caries (DC) and Traumatic Dental Injuries (TDI) on parents' QoL, adjusted by family income.
Design: Parents of 219 children aged five and six answered the Family Impact Scale (FIS) on their perception of their QoL and income. Three calibrated dentists examined the severity of DC according to dmft index and children were categorized into: 0 = caries free; 1–5 = low severity; ≥6 = high severity. TDI were classified as uncomplicated and complicated injuries. QoL was measured through FIS items and total score and Poisson regression was used to associate the variables to the outcome.
Results: Severity of DC showed a negative impact on total score and domains on parental/family activities, parental emotions and financial burden ($P < 0.001$). TDI showed a negative impact on total score and parents' items related to time for themselves, sleep disrupted, family activities and concern for children's fewer life opportunities ($P < 0.05$). The multivariate adjusted model showed that increase in the severity of children's DC (RR = 3.19; 95% CI = 2.36, 4.31; $P < 0.001$) was associated to a greater negative impact on parents' QoL, while high family income was a protective factor (RR = 0.68; 95% CI = 0.48, 0.95; $P < 0.001$).
Conclusions: The severity of children's DC and a lower family income had a negative impact on parents' QoL.

O15-133

Strategies to assure access and equity: innovative safety net paediatric residency training partnerships

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Access to oral health services remains a critical problem for the underserved in the US.The current safety net is fragmented and facing serious resource challenges in the current economy. The Lutheran Medical Center (LMC), a Federally Qualified Health Center (FQHC), has developed innovative post doctoral residency training programs, including pediatric dentistry. The distributed educational program places residents within 17 states, territories and internationally as a means of increasing access; ameliorating recruitment and retention issues. This service learning initiative has been a national resource for workforce solutions. Accreditation by ADA/CODA of all training sites for pediatric dentistry is a major objective.
Methods: Through collaborative partnerships with FQHCs pediatric residents are placed full time in health centers. Didactic curriculum is delivered through distance learning methodologies. Data has been collected and will be presented through an on line outcomes assessment and evaluation system including: utilization/special needs populations/retention/and the effectiveness of distance learning.
Results: The LMC programs place over 200 residents in 17 states and internationally; with close to 25% being pediatric residents. Residents generate over 200 000 visits annually with an estimated 15% to special needs patients. Outcomes data suggest that close to 30% of residents continue to provide care to the underserved and most vulnerable children.
Conclusion: The mission of LMC, as an institution without walls continues to increase access to care for children most in need. The integration of strong leadership. community based partnerships and service learning is an innovative approach and model, both nationally and internationally, that may have future implications for pediatric residency expansion. It is a powerful example of how one small institution can make a difference among children, their families, providers and the global community.

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O15-134

High fluoride exposure in drinking water: Effect on children's IQ, one new report

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Aim: We investigated the effect of chronic high fluoride (F) exposure on children's intelligence.
Design: In this cross sectional study two urban communities with similar socio-economic and cultural status but with different levels of F in drinking water, in the Kerman province, were studied: Koohbanan city (F 2.38 mg/L), Baft city (F 0.41 mg/L). Study samples consisted of 119 children 6–9 years old: 59 children from Koohbanan and 60 children from Baft. The Raven's test used to determine the effect of F exposures on children's IQ.
Results: In the low F area (control group) the mean IQ score of children was 97.80 ± 15.95 that decreased to 91.37 ± 15.63 for the high F group (Koohbanan's children), which was significantly different from the control group ($P < 0.05$).
Conclusion: Based on the findings, the chronic exposure to high levels of F can be one of the factors that influence intellectual development.

O15-135

Digital interactive telehealth center: mother-child health specialization course for primary care health professionals using tele-education, 2nd opinion, and a interdisciplinary approach

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Introduction: The Open University of the Unified Health System (UNA-SUS) is an e-leaning program developed by the Brazilian Ministry of Health, in cooperation with the Pan-American Health Organization (PAHO-WHO). It is a collaborative network among Academic Institutions, and Health Services of the Unified Health System (SUS) with the aim of permanent education of the SUS' health workers, using educational interactive technology resource, e-learning and Primary Care Telehealth.
Case report: Focusing on Primary Care and maternal and infant mortality reduction, the Mother-Child Health Specialization Course was developed by the Federal University of Maranhão in cooperation with the Brazilian Telehealth Program – São Paulo group (USP), and involved interdisciplinary team composed of pediatric dentists, telemedicine doctor, pediatricians, obstetricians and gynecologists, nurses, audiologist, communications, digital designers, and media specialists who created an Internet based Digital Interactive Telehealth Center for nationwide educational purpose. The course's content is presented in structured text, practical videos, 3D graph computation sequence (object learning – virtual man project), dramaturgic videos, infographics. Specifics subjects are complemented by distant 2nd specialized opinion. This 12-month course was designed to enable practical decisions and use multiples interactive technologies (DVDs, discussion list, chat, webconference, video streaming, library of videos, object learning, and digital consultation room). Important mother's and child's oral health topics were addressed in a interdisciplinary way by pediatric dentists, pediatricians, nurses and speech language pathologist/audiologist.
Comments: The interdisciplinary approach of the UNA-SUS e-learning program is a unique and promising method for maintaining nationwide permanent education to thirty-thousand SUS Family Health Teams.

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Oral Session O16/Special Needs Patients 1 – Dental Anomalies

O16-136

Rehabilitation of patients with mental and physical disabilities. A case series

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Background: Patients with mental and physical disabilities often present with dental problems, including periodontal and restorative ones. Many of these patients have missing teeth, resulting to reduction of their masticatory efficiency as well as aesthetic and psychological problems.

Aim: The purpose of this study was to evaluate possible positive outcomes resulting from the oral rehabilitation of cases of the patients with disabilities.

Design: Ten patients were used in this study. All of them had been institutionalized and were currently living in semi-homes. Consent forms were obtained by their legal guardians. A questionnaire on the quality of life of the patients as affected by their dental condition as well as on the levels of dental anxiety was obtained. Dental treatment was provided in all patients at the Dental Clinic of the University of Athens by postgraduate paediatric and prosthodontist postgraduates under supervision. The treatment planning included restorations, periodontal and endodontic treatment as well fabrication of removable partial dentures. The patients were placed in a 4 months recall and the questionnaire was completed again 8 months after treatment.

Results: Analysis of the questionnaires showed improvement on all aspects of quality of life examined, as well as decrease on dental anxiety levels. Achieving an acceptable level of oral hygiene needed constant positive reinforcement. Use and maintenance of prosthetic devises was acceptable.

Conclusions: This study of case series showed improvement of the quality of life of patients with disabilities following oral rehabilitation. A greater number of patients are needed for sound results to be obtained.

O16-137

Oral health of visually challenged schoolchildren in Khartoum State, Sudan

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Background: Although oral health care is a vital component of overall health, it remains one of the greatest unattended needs among children with disabilities.

Aim: To assess the oral health status of visually challenged schoolchildren in a special school in Khartoum State, Sudan.

Design: A school-based census was conducted in the only primary school for children with visual impairment, [boys (66.3%), and boarders (33%), children with partial visual impairment (PVI) (44.6%)]. Out of 92 children [mean age (11.8 ± 3.1)], 79 (85%) were examined clinically by two calibrated dentists where DMFT, dmft, OHI-S, dental care index and traumatic dental injuries (TDI) were recorded. Oral health-related quality of life (C-OIDP) was administered to 82 schoolchildren (89%).

Results: Caries experience was 46.8%. Mean DMFT (age ≥12, $n = 33$) was 0.4 ± 0.7 (SiC 1.6), mean dmft (age < 12, $n = 46$) was 1.9 ± 2.8 (SiC 3.4) and the mean OHI-S was 1.3 ± 0.9. Care Index was zero for all. One fifth of the children suffered a TDI (19%). Only 15.9% reported an oral impact on their daily performance. A quarter of the schoolchildren (25.3%) required an urgent need for treatment. Children who suffered from PVI were 3.3 times more likely to be diagnosed with caries compared to children with complete visual loss.

Conclusions: The findings showed the visually challenged schoolchildren to be deprived of oral health care. Relevant oral health promotion and treatment programmes need to be established urgently.

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O16-138

Success rate of dental restorations in children with special needs treated under G.A. 4 year clinical study

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Background: Children and adolescents with special needs are frequently treated under GA for dental treatment with questionable long term results.
Aim: Aim of the study was to evaluate the success rate of dental restorations performed under GA in children/adolescents with special needs.
Design: One hundred and thirty patients with special needs (4–24 years old) operated during 2000–2005 participated in the study. The group included 11 patients with cerebral palsy, 37 with global developmental delay, 29 with learning/mental disability, 22 with autism, seven with Down syndrome, the remaining having various medical/genetic conditions. Following GA treatment, patients participated in a follow-up schedule every 4 months including plaque/calculus removal, fluoride treatment and oral hygiene instructions for them and the parents. Final examination was performed after 4 years.
Results: One hundred and twenty-three patients with restorations of any type (amalgam/composite fillings, endodontics, SSC) were available for final evaluation, the rest failing to attend the recall visits. The number of restorations varied from 1 to 20 in each operation (mean = 9.8). Operating time varied from 30 to 120 min (mean = 67.3). One thousand two hundred and nineteen restorations on 1114 primary and permanent teeth were performed. Overall 85.8% of the restorations were successful after 4 years, 82.5% in permanent teeth and 89.2% in primary. The highest success rate was found in stainless steel crowns (93.9%) and the lowest in composite fillings (79.3%).
Conclusions: In children with special needs, dental treatment under G.A should be performed by experienced specialists and be followed by a strict preventive recall schedule in order to minimize failures of dental restorations and prevent further GA operations.

O16-139

The oral health and dental care experiences of children with learning disabilities

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Background: Little research has been conducted on the oral health of children with learning disabilities. Most of the existing research has investigated the clinical status of children, whilst neglecting to seek their experiences of their own oral health and dental services.
Aim: To explore the oral health and dental care experiences of children with learning disabilities in special schools in Sheffield, UK.
Design: Five focus groups were held with 18 children, aged 8–11 years, with mild, moderate and profound learning disabilities in two special schools in Sheffield. Photos and pictures were used to help facilitate discussions. Four focus groups were audio-taped and transcribed verbatim. One focus group with children who were pre-verbal used sign language and was documented using journalistic and narrative methods. The data were analysed using a framework approach.
Results: Children with learning disabilities were able to describe in detail their experiences with two main themes emerging from the data. These were children's experiences of dental treatment and oral health practices. Participants were able to recognise the role of the dentist and understand the procedures being carried out including seemingly technical aspects such as radiographs and general anaesthesia. Participants described how they, or a carer, looked after their own teeth with particular emphasis on consumerist aspects such as brand names of oral hygiene products.
Conclusions: Research with children with learning disabilities can give them a voice and provide valuable insights into the impact of oral health on their daily lives and their perspectives on dental services.

O16-140

The prevalence of Molar Incisor Hypocalcification in Yorkshire and the Humber and its relationship to socio-economic status

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Background: The 2008–2009 UK National Dental Survey provided an opportunity to conduct a large prevalence study of molar incisor hypocalcification (MIH) in the area of Yorkshire and the Humber, UK
Aim: The aim was to determine the prevalence of MIH in 12 years old in the region and its relationship to socio-economic status.
Design: Twelve years old children were selected from state maintained, mainstream schools using a stratified sampling method and examined at school. Participating dentists were trained and calibrated in the use of the modified Developmental Defects of Enamel Index. Presence, type and extent of enamel defects were recorded for the occlusal, palatal, lingual and buccal surfaces of first permanent molars and for labial surfaces of upper and lower incisors. A diagnosis of MIH was attributed if there was a demarcated defect in one or more of the first permanent molars. Postcodes of participating children were recorded and coded against national deprivation indices for their residential area.
Results: Nine dentists participated. Of 4623 children that were selected, 3234 (69.8%) were examined. Overall prevalence of MIH was 15.8% (14.5% to 17.1%). There was a significant ($P = 0.003$, chi squared test) association between prevalence of MIH and deprivation with a positive correlation in the first four quintiles. The prevalence of MIH in fluoridated Newcastle was not higher than the other areas.
Conclusions: Prevalence of MIH is equivalent to other European populations. Presence of MIH was lowest in children residing in areas of low socio-economic status.

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O16-141

Aetiology of Molar Incisor Hypomineralisation (MIH) and the medical history

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Aim: To investigate the etiology of MIH and its relationship to the medical history of children.
Design: Sample of two groups of children, aged from 7.5 to 18 years (mean 11.2 years) from those attending the Hospital for treatment. Forty-five and 39 subjects were recruited as MIH cases and controls respectively. Medical history of children was obtained in a chronological method. A parental questionnaire designed and answered by the parent. The children's general medical practitioners of both groups were contacted by post and asked to return a copy of the computer generated records, manuscript and type written records of the children's medical history during the first 5 years of life.
Results: Thirty-nine MIH and 37 control cases were ready for analysis. Upper respiratory tract infection (URTI), tonsillitis and pyrexia, showed strong associations with MIH (P 0.045, P 0.022, P 0.011 respectively). MIH and a history of chickenpox was slightly significant (P 0.052). However, age group analysis revealed most of the children with MIH had chickenpox during the first 2.5 years of life. No association between neonatal problems, gastroenteritis, eczema, otitis media or asthma and MIH.
Conclusions: We believe MIH is a multi-factorial, and there is strong link between different variables found to have an affect on the MIH. Tonsillitis, URTI, pyrexia, and Chickenpox are the four main variables responsible for the MIH defect, and all these four variables are associated with epithelial cells degradation and deactivation which might have the same affect on the enamel forming cells of ameloblasts.

O16-142

Management of patients with Amelogenesis Imperfecta: a case series

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Introduction: Amelogenesis Imperfecta (AI) is a group of enamel defects that is inherited or sporadic in origin affecting both the primary and permanent dentition. The reported prevalence of AI varies from 1:14 000 in the USA to 1:400 in Sweden. The various types of AI can be classified according to the phenotype, mode of inheritance and more recently by its molecular basis. AI is causes by mutation in the genes that code for proteins involved in amelogenesis, such as AMELX, ENAM, KLK-4, MMP-20 and DLX3. Clinically the management of the dentition is based on the phenotypic characteristic of the enamel. The enamel in AI patients is either hypoplastic, hypomature, hypocalcified or a combination of these qualitative and quantitative defects.
Case report: A case series of a group of paediatric patients diagnosed with hypoplastic, hypomature and hypocalcified AI in the Dublin Dental University Hospital will be presented. The main complications encountered while treating the primary and permanent dentition of these patients included rapid tooth surface loss, discoloured, unaesthetic enamel, caries, marginal gingivitis, sensitivity and loss of vertical dimension. An evidenced based rationale for the treatment planning, clinical management and follow up of these cases will be discussed.
Comments: Clinical management of patients with AI depends on early diagnosis with appropriate preventative and restorative intervention to facilitate normal function and aesthetics. This case series highlights the important role paediatric dentists play in the successful management of young patients with AI.

O16-143

Prevalence of Molar-Incisor-Hypomineralisation (MIH) among German school children

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Background: Previous studies in Germany report a prevalence of MIH 2.4–11.0%. In Europe, MIH prevalence is 5.9–14.3%, but few studies also report high values of about 40%.
Aim: The aim of the study was to determine the prevalence of MIH in school children in Greifswald/Germany and to compare this with other studies.
Design: In the compulsory dental school examination, the first permanent molars, permanent incisors and second deciduous molars were examined in 443 2nd to 4th grade children, aged 7–10 years (mean 8.45 ± 1.0) for the presence of demarcated opacities, post-eruptive enamel breakdown, atypical restorations and possible extractions due to MIH, according to the criteria of EAPD (2003). Examinations were performed by one calibrated examiner ($\kappa = 0.9$) on clean teeth after tooth brushing and drying teeth of interest with manual air spray. Defects < 1 mm were not recorded.
Results: The prevalence of MIH was 4.29% (4.21% boys, 4.37% girls). The mean number of affected permanent teeth was 5.11 ± 2.6 (5.8 ± 2.9 including deciduous molars). Among the children with MIH, 36.84% had at least one affected deciduous molar. 85.57% of the affected teeth had demarcated opacities, 14.43% enamel breakdown and 15.46% atypical restorations (14 GIC, 1 amalgam). Only in one child with severe MIH, one extraction was possibly performed due to MIH.
Conclusions: The prevalence of MIH in Greifswald was comparable with other Germany studies, but lower than most international studies.

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O16-144

Micro-CT study on deciduous molar hypomineralisation (DMH)

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Background: Clinically, deciduous Molar Hypomineralisation (DMH) resembles Molar Incisor Hypomineralisation (MIH). Studies on permanent molars with the microCT, (miniaturised version of the total body CT scan and a non-destructive x-ray absorption microscopic technique for 3D visualisation of teeth), showed a significant reduction of hydroxyapatite concentration in affected enamel of MIH-molars. But little is known about the mineral content and mineral density of DMH molars.
Aim: Our aim was to describe the differences in hydroxyapatite content between sound- and opaque areas in DMH molars and healthy teeth.
Design: Five extracted second primary molars from three children (two girls, mean age 5 years and 7 months) were studied, of which four molars were DMH-molars with yellow opacities and one molar was sound. The roots were removed; the teeth were stabilized in impression material (Impregum®) and stored in water with a thymol crystal. The teeth were kept wet during scanning with the μCT40 (integration time 0.6 s; resolution 0.036 mm).
Results: The density of the hydroxyapatite in the yellow opacities (1143 mg HA/cm^2) was less than the unaffected enamel (1516 mg HA/cm^2) or the enamel of the sound molar (1721 mg HA/cm^2). The amount of hydroxyapatite in the yellow opacities is slightly higher than in dentin (DMH enamel: 1143 mg HA/cm^2; sound dentin: 903 mg HA/cm^2).
Conclusions: Molars, clinically showing yellow opacities, have lower hydroxyapatite content in the enamel. The enamel in these second primary molars is now confirmed to be hypomineralised, justifying the clinically assessed name DMH.

O16-145

Central odontogenic fibroma in a 7-year-old patient

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Introduction: Odontogenic fibroma (OF) is a rare neoplasm characterized by varying amounts of inactive-looking odontogenic epithelium embedded in a mature, fibrous stroma. An epithelium-poor and an epithelium-rich subtypes are recognized. The lesion can be intraosseous or peripheral, the intraosseous type representing 0.1% of all odontogenic tumors. Radiographic characteristics can be variable, but OF usually presents as a well-defined unilocular radiolucent lesion and it may be associated with the crown of an unerupted tooth. A case of an odontogenic fibroma in the posterior left mandible of a 7 year-old boy is reported.
Case report: The patient was referred for evaluation of a painless swelling in the left mandible of a few months duration, associated with the missing deciduous molars. His medical history was noncontributory. Radiographic examination revealed a well-defined radiolucent lesion encompassing the tooth germ of the second permanent premolar, while that of the first premolar was proximally displaced. With a clinical diagnosis of dentigerous cyst, surgical removal was decided. A solid lesion was enucleated and the pathologic diagnosis was epithelium-poor type of OF. Healing was uneventful and no signs of recurrence were evident in the 4 months follow-up.
Comments: Although extremely rare, central OF should be included in the differential diagnosis of intraosseous lesions in children, as it may be associated with missing teeth and mimic other common lesions, such as dentigerous cysts.

O16-146

Prevalence of and associated factors with MIH in Flemish School Children

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Aim: To report the prevalence and associated factors of Molar Incisor Hypomineralisation (MIH) in Flemish children.
Design: The study population consisted of a convenience sample of 263 Flemish children (6–10 years old) from three different schools in and around the city of Ghent (Belgium) living at least the first 3 years of their lifes in Belgium. Data on MIH in primary and permanent dentition were obtained during a clinical exam according to the criteria of Mathu-Muju and Wright (2006). The parents or guardians completed a questionnaire dealing with aspects of the mother's health before and during pregnancy and the child's health during the first 3 years of life.
Results: Sixty-four percent of examined children had clinical signs of MIH in the primary dentition and 18% in the permanent dentition. Within the latter group, 36% presented with signs of hypomineralisation on the molars aswell as on the incisors. MIH in both dentitions was seen in 25.4% of the children. Statistical significant relationships were observed between the presence of MIH and having roseola ($P = 0.029$) and gastrointestinal disease ($P = 0.017$) in the first 3 years of life or having chicken pox in the second or third year of life ($P = 0.034$).
Conclusion: In this convenience sample, MIH was significantly more seen in children who suffered in there early ages of roseola and gastrointestinal diseases, which are medical conditions most of the time associated with fever. Further research is recommended in order to determine risk factors for MIH development especially in the primary dentition

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O16-147

Clinical evaluation of desensitizing treatments for incisor teeth affected with molar-incisor hypomineralisation (MIH)

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Background: Sensitivity complaints are commonly seen in the teeth affected with MIH.
Aim: The aim of this study was to evaluate the effect of desensitizing agents applied with and without ozone to the incisors affected with MIH.
Design: Ninety-two incisors of 33 children with MIH were divided in three main and six subgroups. Fluoride varnish (Biflorid 12, Voco, Germany), fluoride varnish after Ozone treatment (Ozonytron®X GmbH, Germany), CPP-ACP paste (GC Tooth Mousse, Recaldent™, Australia), CPP-ACP paste after zone treatment were applied respectively to the Groups 1A,2A,1B and 2B. Fluoride containing CPP-ACP paste (MI Paste Plus, Recaldent™, Australia) and Fluoride containing CPP-ACP paste after Ozone treatment were applied to the Group 3A and 3B respectively. The responses to cold stimuli were recorded using Visual Analog Scale (VAS) before and immediately, 1 and 4 weeks after treatment.
Results: There were statistically significant decrease in hypersensitivity compared to baseline in all groups ($P < 0.05$). Group 2A and 2B showed greater reduction in hypersensitivity both immediately after the treatment and after 1 week compared to all groups. However it was statistically significant when compared to Group 1A ($P < 0.05$). Group 2B showed better reduction than all groups at 4 weeks control, the difference was statistically significant when compared to Group 1A ($P < 0.05$).
Conclusion: Desensitizing agents are found effective in reducing the hypersensitivity of the teeth with MIH. CPP-ACP paste was found more effective and ozone therapy also prolonged the effect of CPP-ACP paste.

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Oral Session O17/Cariology 4 – Prevention 2

O17-148

Caries prevalence in 20 year old Swedish individuals in relation to their previous caries experience

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Background: To our knowledge there are no longitudinal studies in a cohort of individuals evaluating the relation between early childhood caries and caries experience at 20 years of age. Furthermore, there is limited information of caries prevalence at 20 years of age.
Aim: The present study aims to describe caries prevalence at 20 years of age in relation to caries prevalence at 3, 6 and 15 years of age.
Design: A cohort of five hundred individuals has been longitudinally followed from 1 to 20 years of age concerning caries prevalence. The individuals were exposed to clinical and radiographic dental examination at 3, 6, 15 and 20 years of age. The study is ethically approved and informed consent has been achieved.
Results: Children caries-free at 3, 6 and 15 years of age had as a mean 0.92 D_{i+m} FSa in premolars and molars at 20 years of age. Children with manifest caries at 3 and 15 years of age had 7.32 D_{i+m} FSa at 20 years of age. Children with manifest caries at 3 years of age and caries-free at 15 years of age had 1.27 D_{i+m} FSa.
Conclusion: There are strong correlations between caries experience at 3, 6 and 15 years of age and the caries prevalence at 20 years of age. However, this correlation seems to be dependent on caries prevalence at 15 years of age.

O17-149

The effect of two remineralising protocols on regression of white spot lesions after fixed orthodontic therapy: a randomised clinical trial

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Background: White spot lesions (WSL) are frequently found after treatment with fixed orthodontic appliances (FOA). Fluoride is supposed to promote remineralisation of WSL.
Aim: To evaluate regression of WSL after removal of FOA, comparing the effect of two remineralising protocols, one of which included application of fluoride varnish.
Design: After removal of FOA, patients having WSL on mesiobuccal, buccal or distobuccal surfaces were consecutively included and randomised to test (n = 23) or control (n = 23) group. At first examination and on check-ups after 14 days, 1, 4 and 6 months, WSL were classified according to ICDAS II. All patients were instructed on proper toothbrushing with fluoridated toothpaste; thereafter, fluoride varnish (Fluor Protector, Ivoclar Vivadent, Schaan, Lichtenstein) (test group) or placebo (control group) was applied. For statistical analysis paired t-test and Mann-Whitney test were used.
Results: The average number of WSL-affected surfaces per person decreased from 13.9 ± 7.8 to 9.9 ± 6.8 in 6 months ($P < 0.05$). In test and control groups, the average numbers of WSL-affected surfaces that regressed from code 1 to code 0 were 2.1 ± 2.2 and 1.6 ± 2.0, respectively ($P > 0.05$). For regression from code 2 to code 1 the respective numbers were 0.4 ± 0.7 and 0.5 ± 0.7, respectively ($P > 0.05$) and for regression from code 2 to code 0 3.1 ± 2.8 and 3.3 ± 2.6, respectively ($P > 0.05$).
Conclusions: After removal of FOA and intensive instructions on toothbrushing with fluoridated toothpaste, the decrease in the number of WSL-affected surfaces was significant. However, additional effect of fluoride varnish was not confirmed. Many WSL did not regress during the period of the study.

O17-150

Effects of applied topical fluoride preparations in orthodontic patients

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Introduction: Demineralization of the enamel surface close to bonded orthodontic brackets after treatment is a current problem, especially in the form of white spot formation.
Aim: The aims of this *in vitro* study were to compare the cariostatic potential of a resin modified glass ionomer cement (Fuji Ortho LC) to that of a control Dentaurum (Orthodontic Bonding System) for bracket bonding and to compare the effect of extrinsic fluoride application on the cariostatic potential of each material.
Design: Orthodontic brackets were bonded to 60 extracted premolars, 30 with Fuji Ortho LC and 30 with Dentaurum (Orthodontic Bonding System). The teeth then were stored in artificial saliva (*in vitro*) over a 30-day period. Ten teeth bonded with each material were immersed in a 0.05% fluoride solution (Fluorogal) for 2 min each day. After 30 days fluorides release was measured throughout the study from all teeth.
Results: Fluoride release from Fuji Ortho LC alone fell to minimal values, but with the addition of extrinsic fluoride the levels fell initially and then followed an upward trend. There was minimal fluoride release, from Dentaurum (Orthodontic Bonding System) alone, but with daily addition of extrinsic fluoride, subsequent fluoride release was increased. Significant differences existed in the amount of fluoride released between all groups, except comparing Fuji Ortho LC alone and Dentaurum with added fluoride.
Conclusion: The greatest bioactive potential showed the group where beside the material, an additional material was used as the product which releases fluoride. The resin-modified glass ionomer cement alone and the composite with added fluoride demonstrated equivalent protection.

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O17-151

Effectiveness of fissure sealants on questionable occlusal surfaces of permanent molars. A preliminary report

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Background: The effectiveness of sealants on sound surfaces has been established but the results on their effectiveness on questionable surfaces are contradictory.
Aim: To study the retention and effectiveness of sealants use on questionable occlusal surfaces in clinical practice.
Methods: The sample consisted of 192 patients (88 boys, 104 girls) with a mean age of 8.1(±2.5) years and a mean dmfs/DMFS of 4.9(±7.8) and 0.6(±1.9) respectively. Nine hundred and forty-six surfaces of first and second permanent molars were sealed and followed for 6–13 months (mean time 8.5 ± 2.6 months). Seven hundred and thirty-three sealants were placed in sound and 99 in questionable surfaces: code 1 and 2 according to ICDAS II criteria (265 in fissures and 567 in pits) and two sealant materials were tested (525 were clear and 307 opaque). Before sealant placement operators were calibrated presenting Kappa coefficients for inter and intra examiner repeatability of $k = 0.87$ and $k = 0.89$ respectively. Uni and multivariable Cox's and Kaplan-Maier analysis were used to estimate the probability of sealant success and the relationship of sealants failures to different variables.
Results: At the end of the observation time, 9 surfaces (0.95%) were restored and 14 (1.47%) sealants were reapplied. Statistical analysis did not reveal any differences between different sealant material or different tooth surface most likely due to the short observation time.
Conclusion: Even though data suggested some trends with worsening sealant retention on questionable surfaces and on patients with higher dmft/DMFT, none of them was statistically significant until now, since the study is in progress.

O17-152

Which methods of dental age estimation should we be using?

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Background: Dozens of methods of age estimation using developing teeth are available.
Aim: The aim of this study was to find out which methods of age estimation using permanent mandibular teeth can best estimate age.
Design: Two target samples were made up of panoramic dental radiographs from 946 and 300 individuals aged 3–16 and 11–25 respectively. Performance of 19 methods of age estimation methods excluding third molars were tested on the first target sample and 37 methods using third molars were tested on the second target sample. Performance was measured in various ways including average mean difference in dental age and real age (bias). This was compared to zero using a *t*-test.
Results: Results show that the best dental maturity score was Willems; for individual teeth the best were two new large reference studies with very wide age ranges. Several methods (including Nolla) estimated age with considerable bias. Results for third molar methods showed that only 6 of 37 methods estimated age with bias not significant to zero. This group includes methods based on several world groups suggesting that features of reference data such as age range and age distribution are more important than ethnic origin. The 95% CI of estimated age was ±2 years for methods excluding third molars and ±4 years for third molars.
Conclusion: The conclusion from this study is that dental age estimation methods with minimal bias should be used. Mean estimated age should be reported with a confidence interval bearing in mind the high variance, particularly for third molars.

O17-153

Sealing or restoring manifest occlusal caries in young permanent teeth – 3 years results

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Aim: To investigate the possibility of sealing manifest occlusal caries lesions which otherwise would have been treated with conventional restoration.
Design: This prospective, randomized study is performed in the young permanent dentition with two parallel treatment arms. It includes 518 occlusal caries lesions in 518 patients aged 6–17 years. All lesions were assessed to be in need of operative treatment and limited to the outer half of the dentin. The project was approved by the Ethics Committee. After randomization in the ratio of 2:1, 366 resin sealants and 152 composite restorations were carried out by 69 dentists from 2006 to 2009. Treatments were followed by annual clinical and radiographic controls. Chi-square tests were applied for statistical comparisons between sealants and restorations.
Results: After an average observation period of 3 years, the dropout rate was 1%. Of the sealants 72% were well-functioning, 12% were repaired/renewed, and 16% were replaced by restorations. Of the restorations 96% were well-functioning and 4% were replaced/extended, which was significantly different compared with the sealant group ($P < 0.001$). Radiographic caries progression was recorded in 14% of the sealed teeth and 1% of the restored teeth ($P < 0.001$).
Conclusions: Although the restorations showed the best survival, the majority of the sealed lesions were successfully arrested during the first 3 years. Thus, the results indicate the possibility of extending the criteria for sealing occlusal caries lesions in the young permanent dentition. However, a longer observation period is needed for final conclusion, and treatments will be followed for at least 5 years.

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O17-154

Study on preparation of tea polyphenols gel and its inhibition on cariogenic bacteria *in vitro*

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Aim: To prepare tea polyphenols gel and to assess its inhibition on three selected cariogenic bacteria *in vitro* and to accumulate data for further application of tea polyphenols gel to prevent dental caries.
Design: The gel was prepared with tea polyphenols as main functional component and carbopol 940 as matrix. The quality and stability of tea polyphenols gel was tested by given criteria. Suspension of *Streptococcus mutans*, *Streptococcus sobrinus* and *Actinomyces viscosus* at the concentration of 10^8 CFU/mL was prepared and agar dilution method was applied to determine MIC on these three chosen species.
Results: The gel was stable in quality and its MIC on *Streptococcus mutans, Streptococcus sobrinus* and *Actinomyces viscosus* was 1 mg/mL, 2 mg/mL, 2 mg/mL respectively.
Conclusions: The formula for tea polyphenols gel is applicable. The gel is qualified and able to inhibit the growth of cariogenic bacteria.

O17-155 A

Self-Etching Liners as PIT and fissure sealants: A comparative study on adaptation, microleakage and fissure penetration

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Background: Several modern self-etching liners have been advocated as pit and fissure sealants.
Aim: The aim of the present study was to comparatively evaluate fissure adaptation, penetration and microleakage of liners *versus* conventional sealants.
Design: The liners tested were Vertise-Flow(VF) and Fusio(FS), whereas the sealants Embrace(EM) and Helioseal(HS). Sound premolars extracted for orthodontic reasons were classified into 6 groups (A–F, n:8). Groups A(EM), B(HS) received the sealants after 20s acid-etching with 37% H_3PO_4 gel, groups C(FS), D(VF) were treated with the liners after 15s sandblasting with 30-μm alumina particles and groups E(FS), F(VF) received the same liners, but following acid etching as above. All specimens were light-cured (20s) and stored in water (1w/37°C). The properties tested were: a) Fissure adaptation and penetration (optical microscopy and ESEM, n:8) and b) Microleakage after 24 h/37°C storage in 2% neutral basic fuchsin (optical microscopy, n:8). Adaptation and microleakage were assessed by scoring criteria. Resin penetration in narrow fissures was assessed by linear measurements. Statistical analysis was performed by Kruskal–Wallis one-way ANOVA on Ranks plus Tukey tests (a:0.05).
Results: Cavity adaptation was significantly better in groups A and B. Microleakage was significantly greater in group C. Groups C and D demonstrated the lowest resin penetration into narrow fissures. ESEM revealed extensive debonding at the margins of groups C and D. The hydrophilic nature of FS and VF led to dye absorption into bulk material.
Conclusion: Based on the results of the present study, the liners tested should not be used as pit and fissure sealants without enamel acid-etching.

O17-155B

Self-Etching Liners as PIT and fissure sealants: A comparative study on setting characteristics

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Background: Recently modern self-etching liners have been introduced for efficient pit and fissure sealing. However, there is limited information on their setting characteristics.
Aim: The aim of the present study was to comparatively evaluate their setting characteristics including C=C conversion, extent of oxygen inhibition and hardness.
Design: The liners tested were Vertise-Flow(VF) and Fusio(FS) and the sealants Embrace(EM) and Helioseal(HS). The properties tested were: (a) Extent of C=C conversion of directly irradiated surfaces by ATR-FTIR spectroscopy (%DC, n:4), (b) Extent of oxygen inhibition by transmission optical microscopy(OI, n:4 × 3) and (c) Vickers hardness of directly irradiated surfaces (VH, n:4 × 2). For (a) and (c) disk shape specimens were prepared (Ø:4 mm, d:1 mm) and irradiated for 20s with a LED curing unit (1200 mW/cm^2). For (b) 100 μm-thick specimens were used and cured as above. Statistical analysis was performed by one-way ANOVA and Tukey test (a:0.05).
Results: The highest %DC was found in VF (79%) followed by HS (68.4%), EM (61.3%) and FS (59.2%), all mean differences being statistically significant. The liners demonstrated significantly higher VH (50.3–54.9) from the sealants (29.2–37.4). The smallest extent of OI was recorded in EM (8.5 μm), followed by FS (12.9 μm), VH(13.9 μm). HS(20.3 μm) demonstrated the highest OI.
Conclusion: The liners tested are much harder than the sealants, implying improved wear resistance but increased fracture probability in thin film applications. The liners cure better than the sealants, a finding that may anticipate improved biocompatibility. The oxygen inhibition of the liners was within the range recorded for sealants, suggesting similar sensitivity to ambient oxygen.

O17-156

Qualitative evaluation of oral health's beliefs of paediatric dental patients' guardians

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Background: With the purpose to establish an Educational Program of promotion and prevention in oral health for patients' guardians from the Universidad de Chile Pediatric Dental Clinic (UChPDC), a diagnosis of oral health's beliefs was developed; a cultural analysis of these meanings will allow educating, improving and/or changing the self – concept of oral health.
Aim: To identify the beliefs, needs and practices of oral health of the patients guardians from the UChPDC.
Design:

1. Three surveys were applied to 15 adults (39 questions), about three topics: health beliefs, self efficacy and dental control locus.
2. A semi-structured group interview was applied to the same respondents. Through a qualitative analysis of the answers, quotations were selected to define the categories under study.

Results: Self efficacy: 46.7% responded that they are quite sure of brushing their teeth even if they are tired at night. Dental Control Locus: 60% totally disagree with the belief that if the parents have bad teeth, brushing will not help children. 'Education about oral health prevention' was the most frequently mentioned, highlighting the difficulties of access, lack of media and socio-cultural myths. 'Motivation and education by educational establishments', based on the need for a therapeutic alliance.

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Conclusions: With the socio-cultural diagnosis of this population and having achieved the interpretation of the significance of oral health from the patient's perspective, we are able to develop the educational content to improve and strengthen existing knowledge promoting the empowerment of value expectations consistent with oral health.

O17-157

Remineralization of incipient caries by CPP – ACP: a new perspective

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Background: Dental caries is a chronic, slowly progressing disease with multifactorial etiology. Early diagnosis of the non cavitated lesions and provision of favourable intra oral environment for remineralization of the tooth will reduce the morbidity related to dental caries. Casein Phospho Peptide – Amorphous Calcium Phosphate (CPP –ACP) has shown promising results as one of the remineralizing agents with additional benefits like ease of application, can be used in younger patients where fluoride is not indicated and with added advantage of being a home care measure.
Aim: This study aimed to compare the remineralizing efficacy of CPP – ACP based cream and fluoride varnish on artificially produced carious lesions in human enamel slabs mounted in an in – vivo intra oral appliance.
Design: A total of 30 participants aged 8–24 years, served as carriers for human enamel slabs during the study period. Artificial demineralization was produced in the enamel slabs before mounting them in the appliances. CPP–ACP, Fluoride Varnish and Fluoride Dentifrices were used for remineralization of the artificially produced lesions. The extent of remineralization were evaluated at 15 days, 1 and 3 months by using Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscope (EDS).
Result: CPP-ACP showed maximum remineralization score after 15 days as compared to fluoride varnish and fluoride dentifrice. Remineralization after 1 month showed no further increase for CPP-ACP, where as statistically significant difference ($P < 0.01$) was found in the varnish and dentifrice group. Similarly 3 month evaluation of the remineralization showed a further increase in all the three groups but it was least in the CPP –ACP group.
Conclusion: Maximum remineralization occurred by once daily use of CPP-ACP cream within 15 days after which it reached a plateau phase

O17-158

Tooth bleaching in children and adolescents

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Background: Discolored teeth in children and esthetic smile color demands in young adolescents quite often need professional attention. A few experimental and clinical data though have been so far recorded for efficient and safety tooth color altering in these individuals.
Aim: The aim of this study is to present documented bleaching protocols according to age's limitations through clinical cases.
Design: Information available in original research papers and reviews listed in PubMed or Science (search terms: bleaching OR brightening OR whitening OR safety and primary teeth OR mixed dentition and children OR adolescents) was included in the study to form bleaching protocols for whitening procedures in the age groups: (a) 7–9, b) 10–12, c) 13–15 and d) 16–18 years.
Results: (i) Although bleaching is not forbidden, it is not suggested for primary teeth or the mixed dentition (group a, b). (ii) Whitening in healthy adolescents is a case-by-case determination that must weigh factors such as the level of individual tooth or teeth' discoloration, the status of oral hygiene, behavioural habits, the age of first intervention *versus* improved esthetic perception. Mild peroxide percentages and over the counter bleaching products can be suggested (group c, d).
Conclusion: Bleaching procedures with mild whitening products can be applied for altering individual discolored teeth in children or the whole arch in young adolescents after careful case selection using stringent criteria.

O17-159

Odontoglyphics of the deciduous molars and caries lesions

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Introduction: The widest spread of 'dental' problems in children nowadays is thel occlusal caries in deciduous molars. There are several factors involved in the development of caries process, yet some there have not been taken into account, such as odontogliphics.
Aim: The aim of our study is to search whether peculiarities of occlusal surface morphology in deciduous molars contribute to the development of caries lesions.
Design: We have investigated 84 deciduous molars of upper and lower jaws, in 2.5–8 year-old children. All teeth had antagonistic and antimere teeth. There were 54 antimeres with caries lesions on occlusal surfaces and 30 – were intact. Worn teeth or teeth with any abnormal development were excluded from our research. Impressions were made of the deciduous molars by means of silicone material 'SpeedEx'. Models were cast in fine gypsum and Odontogliphics of the deciduous molars were studied.
Results: The results of this study indicated that intricate main grooves were present in 70% of all studied teeth. Only in 50% of the decayed teeth such complicated main grooves contributed to the development of caries lesions. Yet in cases of occlusal surfaces which had supplemental traits, caries lesions had developed in 97%.
Conclusions: Consequently we may confirm that more complex odontogliphics of the deciduous molars are contributing in the development of carious lesions of occlusal surfaces. Pediatric dentists can use such procedure as gypsum molding to analyze occlusal surfaces for further decay development prognosis.

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Oral Session O18/Endodontics

O18-160

Treatment of the immature necrotic open apex: MTA plug –revascularization controversy

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Background: The apexification procedure has been widely used for the endodontic treatment of necrotic open apices. The procedure poses certain disadvantages, such as the long amount of time required for treatment, susceptibility to fracture, and the incomplete formation of calcified bridge at the apex. The use of MTA apical plug is an alternative treatment that has gained popularity recently with optimal clinical results. In the era of 2011 revascularization procedures and regenerative endodontics seems to be the future.
Aim: The aim of this lecture is to describe step by step the clinical procedure of the apical MTA plug technique in necrotic open apex cases under the operating microscope and to compare the procedure with the result obtained from revascularization cases.
Design: In this lecture the procedure of MTA plug technique is presented with the aid of videos of the whole procedure under the operating microscope. Prognosis of the technique and procedural problems are discussed. Moreover two revascularization cases with 2 years follow up in 8 year old children are presented.
Results: Comparison of the results of the cases presented in this clinical lecture is inevitable.
Conclusion: The endodontic and paediatric dentistry community should shift their treatment approaches to necrotic open apex cases towards regenerative endodontics. Until a definite treatment protocol is provided from Academia the MTA plug technique remains viable.

O18-161

Comparison between grey and white MTA in temporary molars pulpotomies – 84 months follow-up

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Background: Pulpotomy is still the most frequent endodontic treatment performed on primary molars. Many alternatives to formocresol have been proposed. One alternative seems to be mineral trioxide aggregate (MTA) as it is a more biologically acceptable product.
Aim: The aim of this study was to conduct a long-term evaluation of pulpotomy in temporary molars with Grey and White MTA and compare the results in a sample of 233 primary molars with a maximum follow-up period of 84 months.
Design: This prospective study included first and second primary molars treated with pulpotomy with Grey or White MTA, controlled clinical and radiographically for a maximum follow-up period of 84 months. Statistical analysis was completed using ANOVA ($P < 0.05$).
Results: Follow-up evaluations, performed every 6 months, revealed that only 2 molars treated with White MTA presented abscess and pathological mobility. Radiographic examination of the 210 molars revealed unfavourable pulp response in only 6 molars (internal or furcation root resorption), without statistically significant differences between Grey and White MTA. Two radiological findings were noticed: dentine bridge formation and partial or total root canal stenosis. Grey MTA induced a higher percentage of dentine bridges with statistically significant differences ($P < 0.05$), and a higher percentage of pulp canal stenosis, without a statistically significant difference.
Conclusions: Grey and White MTA presented high levels of clinical and radiographic success. Although the present study showed evidence of a very good biologic response with both types of MTA, Grey MTA showed significantly higher number of dentine bridges formation.

O18-162

The challenge of treating orthodontically reimplanted immature and mature central incisors. An 11-year multidisciplinary approach with report of cases

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Introduction: Dental avulsion is the most severe dental injury creating aesthetic, social and psychological problems. Dental replantation has always been a clinical challenge for general practioners, paediatric dentists, endodontologists, orthodontists, implantologists, periodontologists and prosthodontists because of treatment difficulties (e.g; immature teeth, bone biology) and possible consequences (e.g; pulp necrosis, discoloration, dental root and bone resorption, ankylosis). In addition, many of these cases are related to pre-existing occlusal problems leading to a strong dilemma, namely; when and how to treat them. Therefore, it is crucial that, an evidence based protocol be coupled with an appropriate individualized multidisciplinary follow up strategy.
Cases reports: In a 13-year-old girl, the maxillary mature central incisors were replanted followed by endodontic, orthodontic and aesthetic approach. In a 8-year-old girl, the maxillary immature centrals were re-implanted (left 1 h and the right 3 h after their avulsion, respectively). After 6 years, the incisors demonstrated significant biological phenomena, namely revascularization, obliteration, and apexification. Nevertheless, pre-existing malocclusion (class II,1, traumatic occlusion, cross bite, hyperplastic frenum) together with patient concern about aesthetics required comprehensive orthodontic treatment. A multidisciplinary approach based on sound principles of biology and orthodontic biomechanics was instituted. An 11-year comprehensively documented follow-up revealed a successful outcome in terms of health, function and aesthetics, in both cases.
Comments: Successful long-term similar outcome has hardly ever been reported in the literature.

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O18-163

Indirect pulp treatment in 4–6 year old children

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Background: Indirect pulp treatment (IPT) is a procedure for treating primary teeth with deep carious lesions and asymptomatic pulp inflammation to avoid pulp exposure during excavation.
Aim: To investigate the success rate of primary teeth treated with IPT between 2006 and 2009.
Design: In this retrospective study 59 primary teeth with deep carious lesions extending into the inner quarter of the dentin thickness with no clinical or radiographic signs of pulpal inflammation were included. The teeth were treated with IPT performed by dentists and dental students at the Academic Centre for Dentistry Amsterdam (ACTA). Incomplete caries removal was performed leaving infected carious dentin at the center of the cavity. Success of the treatment was defined as no clinical or radiographic signs of inflammation like spontaneous pain, swelling, fistula or radiological abnormalities during the follow up period (1–4 years).
Results: Fifty three teeth (90%) fulfilled the criteria of success. Six teeth were extracted due to abscess, fistula or periapical radiolucency. All failures occurred within 2 years after treatment. No significant difference in success rate was found between dentists and dental students. Teeth excluded because of pre operative pain treated with IPT all failed.
Conclusions: Incomplete caries removal in asymptomatic primary teeth resulted in a high success rate and is an appropriate treatment option in deep carious lesions provided that the restoration seals the cavity properly.

O18-164

Effect of low-level laser therapy on dental pulp cells proliferation and differentiation

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Background: Aggressive periodontitis in juveniles leads, usually, to characteristic angular bone defects at permanent teeth. Regeneration of these defects is clinically challenging and is regulated by complex biological processes involving different cell types. Dental pulp stem cells (DPSC) are multilineage cell populations with extensive proliferative and differentiation abilities. Since these cells are easily isolated they are considered a promising tool for regeneration. Low-level laser therapy (LLLT) has also been proposed as an adjunctive stimulus for cell proliferation and differentiation.
Aim: Evaluate *in vitro* the effect of LLLT on proliferation and differentiation of human DPSC.
Design: DPSC isolated from an extracted 3rd molar were cultured and exposed to low-level laser therapy with an Nd YAG Laser for 20, 40, 60 and 120 s. Proliferation of DPSC was evaluated by measuring cells in a hemocytometer after detachment with trypsin at 24, 48, 72 and 120 h. Differentiation was determined at the same time-points by calculating the alkaline phosphatase (ALPase) activity and the secretion of osteocalcine (OC) from the supernatant.
Results: Preliminary results demonstrate that, compared to the control, all conditions of LLLT increased the ALPase activity at 24 and 48 h. ALPase activity reached control levels by 120 h. Proliferation did not differ among the various groups at the first 48 h, but increased significantly in all laser-treated groups up to 120 h. OC levels remained low in all cases.
Conclusions: LLLT induces, initially, differentiation of DPSC to mineralized-tissue forming cells and consequently promotes their proliferation. These findings may justify the clinical application of LLLT.

O18-165

Cleaning efficacy of rotary endodontic files in root canals of primary teeth

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Background: Many studies have evaluated the cleaning ability of rotary instruments in permanent teeth and have given contradictory results. However, there are very few studies on the efficacy of these instruments in root canals of primary teeth.
Aim: This study aimed at evaluating the efficacy of rotary instruments in smear layer removal and reduction in microbial counts of root canals in primary teeth.
Design: The *in-vitro* study sample consisted of thirty primary incisors which were divided into three groups: Group A: teeth instrumented using rotary Ni-Ti files; Group B: teeth instrumented manually using Ni-Ti files and; Group C: teeth instrumented manually using stainless-steel files. Following root canal preparation, roots were sectioned longitudinally and canals evaluated under SEM for removal of smear layer, at the level of coronal, middle and apical third. For microbial counts, 20 primary molars indicated for pulpectomy were selected and divided into two groups: Group A: teeth instrumented using rotary Ni-Ti files and Group B: teeth instrumented manually using Ni-Ti files. Under rubber dam isolation, sterile paper points were used to take canal samples, both prior to and following canal preparation. Dilutions were made and inoculated onto a suitable medium for assessment of microbial counts.
Data was statistically analyzed.
Results: Rotary instruments removed significantly more smear layer in the coronal and middle third of canals, as compared to hand instruments. Reduction in microbiological counts was observed with rotary instrumentation.
Conclusions: Rotary instruments were efficient in cleaning root canals of primary teeth.

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Oral Session O19/Special Needs Patients 2

O19-166

Long term salivary function after conditioning with busulfan, fractionated or single dose TBI

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Background: Children treated with hematopoietic stem cell transplantation are at risk for oral and craniofacial late effects.
Aim: To study if conditioning with fractionated total body irradiation (TBI) or Bu will result in less salivary dysfunction compared to single dose TBI and investigate contribution of other known risk factors for a low salivary secretion rate after hematopoietic stem cell transplantation (HSCT).
Methods: The study included 74 adolescents at 15 years of age who were recipients of allogeneic HSCT and had received conditioning with either: sTBI, fTBI or Bu. The unstimulated (USSR) and stimulated (SSSR) salivary secretion rates were determined. A USSR ≤0.1 mL/min and an SSSR ≤0.5 mL/min, was considered low.
Results: Irrespective of conditioning, there were no significant differences in USSR or SSSR. When comparing the whole group, girls had a significantly lower SSSR, 0.7 ± 0.3 mL/min compared to 1.1 ± 04 mL/min in boys ($P < 0.001$). A correlation between age at time of transplantation and SSSR at 15 years of age ($P = 0.02$) was found in children conditioned with sTBI as well as an inverse correlation between the plasma AUC of Bu and the SSSR. In the multivariate model female sex was significantly correlated to low SSSR at 15 years of age (3.93, 1.21–12.79; $P = 0.021$).
Conclusions: There was no difference in salivary function after HSCT in adolescents receiving conditioning with sTBI, fTBI or Bu as well as an inverse correlation between total systemic exposure of Bu and salivary secretion.

O19-167

Management challenges of a patient with cystic hygroma – a case report

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Introduction: Cystic hygroma (CH) is a congenital malformation of the lymphatic system, with an incidence of 1:6000. It usually affects the neck, with left predilection and aetiological factors include environmental and genetic factors.
Case report: We describe the case of a 13-year-old female who presented with spontaneous dental pain affecting the maxillary left first and second permanent molar teeth, on a background of left sided cervico-facial-thoracic CH. She was diagnosed with periapical periodontitis and required extraction of both teeth. Clinical management was compromised by the CH involving the left face, neck, ear, tongue, larynx, oropharynx and mediastinum and circling the trachea and great vessels. This previously required multiple debulking operations, glossectomy, mandibular ostectomy and tracheostomy until the age of twelve. Initial management involved placement of obtundant dressings with resolution of symptoms. Dental treatment was complicated by significant trismus and the unacceptably high risk associated with general anaesthesia, due to intubation difficulties. It proved impossible to achieve satisfactory analgesia with local anaesthesia (LA). Due to her difficult airway, it was decided to treat the patient with inhalational sedation, but administered in an operating theatre by a consultant anaesthetist, and teeth were extracted using articaine LA. Access was difficult, but teeth were elevated intact. The patient recovered well and was discharged on the same day. Preventive care is ongoing.
Comments: This is the first report to our knowledge describing dental extractions in the immediate vicinity of a cystic hygroma. We discuss a potential management strategy and the difficulties of conventional methods in such patients.

O19-168

Oral health of medically compromised children

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Background: Medically compromised children have usually inadequate dental care and poor dental public health measures that may have a negative influence on their oral health status.
Aim: To estimate the prevalence of dental caries, oral hygiene, presence of malocclusion and to evaluate eruption times of the permanent molars among medically compromised children.
Design: A study was carried out on a group of 147 non-institutionalized medically compromised children (aged 6–16 years) at the School of Dentistry, University of Belgrade, Serbia between 2008 and 2010. The control group comprised of 104 healthy school children matched to the study group by age and sex.
Results: Medically compromised children had a statistically higher mean dmfs (9.32 ± 7.67) and DMFS (10.93 ± 10.23) values than children from the control group (5.73 ± 6.99 and 4.44 ± 5.19 respectively $P < 0.001$). A significantly higher percentage of Class II malocclusions as well as a higher tendency to a delayed time of eruption of second permanent molars were observed in the test group for the permanent dentition ($P < 0.001$).
Conclusions: Oral health status was significantly poorer in the medically compromised children compared to healthy children. The data obtained will be helpful in estimating the requirements for dental treatment in medically compromised children and will be relevant for the National Oral Health Strategy for Medically Compromised Patients.

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O19-169

The outcome of Crohn's disease in children who present with oral manifestations at diagnosis

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Background: Oral mucosal lesions may be present at the time of diagnosis of Crohn's Disease (CD).
Aim: The aim of this study was to describe the outcome for children who had oral lesions at the time of diagnosis of CD, and to determine if there was a difference in the Pediatric Crohn's Disease Activity Index (PCDAI) scores between those with and those without oral lesions at follow-up examination.
Design: Thirty-one patients who had oral lesions at the time of diagnosis of CD and who had enrolled in two previous studies were invited to participate. The treatment of CD that had been provided for patients was recorded and clinical and laboratory data were collected to calculate the PCDAI.
Results: Twenty-four of 31 patients participated (77%). Mean age at follow-up was 15.7 years (SD 1.98, range 11.9–19.7 years). Mean duration of follow-up was 55 months (SD 22, range 20–97 months). Oral lesions were present at follow-up in 7 (29%) of 24 patients. There were no differences between patients with and without oral lesions at follow-up examination with regard to medical treatments received or intestinal disease location. There was no difference in median PCDAI scores between those who had and those who had not oral lesions at follow-up examination.
Conclusions: Oral lesions resolved in the majority of children treated for intestinal CD. The occurrence of oral lesions at follow-up examination of children who had oral lesions at initial diagnosis was not a marker for CD activity elsewhere in the intestinal tract.

O19-170

Dental treatment of patients with systemic diseases and patients with developmental disabilities under general anaesthesia

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Background: When treating patients under GA, practitioners often tend to be radical in treatment modalities and perform less complex and questionable procedures in order to avoid the need for repeating treatment if they fail. When treating patients with special needs, these factors are extremely important.
Aim: To investigate differences in dental morbidity, dental treatment, duration of treatment between patients with systemic diseases (SD) and patients with developmental disabilities (DD), who were treated under general anaesthesia (GA).
Design: Medical and dental records of 46 SD patients (23 boys and 23 girls), and 75 DD patients (45 boys and 30 girls).aged 2–20 years who received dental treatment under general anaesthesia were examined. Age, gender dmft/DMFT, dental procedures, duration of GA and need for post-treatment hospitalization were recorded.
Results: Before treatment, in the primary teeth, dental morbidity was significantly higher among the SD patients (0.04). In the permanent teeth, dental morbidity was higher among the CD patients, however not significantly. Teeth were significantly more restored, and total dmf was significantly higher among SD patients ($P = 0.015$ and 0.43 respectively). In the permanent teeth, more extracted and more restored teeth were noted among DD patients, as well higher total DMF, however not significantly. Only pulpectomies were significantly more prevalent among the DD patients ($P = 0.038$). Six patients needed hospitalization due to their diseases.
Conclusions: The dental treatment under general anaesthesia for SD patients did not differ from the dental treatment to DD patients.

O19-171

Dentists' knowledge and views on treating children with hereditary coagulation disorders

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Background: Dental management of the child with a hereditary coagulation disorder (HCD) poses many challenges. Dentists report low levels of confidence in treating children with HCDs.
Aim: The aim of this research was to investigate the education, knowledge, views, level of confidence, and perceived support available to community-based dentists when treating children with a HCD.
Methods: All dentists employed by the community service in Ireland were invited to participate in an internet-based survey.
Results: One hundred and twenty three dentists responded to the survey. Thirty-nine percent of respondents felt adequately trained to safely and effectively manage patients with HCDs. Twenty-three percent were aware of guidelines available regarding these patients. Seventy-nine percent of respondents had encountered a child with a HCD in their clinic/practice. The dentists perceived an adequate level of support by the tertiary care haematology (73%) and dental teams (82%). The respondents showed a great degree of variability in their knowledge of the requirement for haemostatic support for dental procedures. 61% of respondents rated themselves very or somewhat anxious when treating children with HCDs. Many respondents expressed their interest in further education, guidelines and advice on the subject of dental care for children with HCDs.
Conclusions: Although the majority of dentists surveyed had encountered a child with a HCD in their clinic/practice, their levels of knowledge and confidence regarding care for these patients are low.

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O19-172

Acidity and *in vitro* effects on dental hard tissues of pharmaceutical preparations used in paediatric cardiology

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Aim: The knowledge of oral health effects caused by long-term medication in medically compromised children is sparse. Besides the effects on salivary secretion, pharmacotherapy may also act directly on the dental hard tissues, with dental caries and/or erosive lesions as possible outcomes of their acid and fermentable sugar content. The study was performed in order to increase the knowledge of possible effects on dental hard tissues caused by pharmaceutical preparations used regularly and on a long-term basis in children with severe heart disease.

Design: The study was performed *in vitro*. Thirteen pharmaceutical preparations commonly used on a long-term basis in paediatric cardiology were selected. The endogenous pH of water solutions of tablets, capsules, and liquid medicines were measured with a pH meter. The titratable acidity and the dissolution of calcium and phosphate after immersion of tooth specimens were quantified for preparations with an endogenous pH below 5.5.

Results: The endogenous pH values varied between 3.03 and 9.02. Six of the 13 preparations (46%) had an endogenous pH below 5.5. The captopril (12.5 mg) tablet water solution had the lowest pH while the propranolol hydrochloride mixture displayed the highest titratable acidity. The highest dissolved calcium and phosphate was displayed for captopril (12.5 mg) tablet water solution followed by acetylsalicylic acid (75 mg) tablet water solution.

Conclusion: It is concluded that some pharmaceutical preparations that are commonly used on a long-term basis in paediatric cardiology may pose a hazardous threat to dental hard tissues due to their acidity.

O19-173

Antibiotic prophylaxis in dental treatment of children with congenital heart defects (CHD)

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Background: Recent guidelines suggest a more restrictive use of antibiotic prophylaxis against infective endocarditis (IE).

Aim: To examine to what extent children with CHD are treated according to the current antibiotic prophylaxis guidelines in dentistry.

Design: A cross-sectional pilot survey in which a questionnaire was sent during fall 2009 to all registered dentists and dental hygienist ($N = 195$) working in the Public Dental Service in a county of Norway. The study focused on the following items about indications for antibiotic prophylaxis against IE: target groups, dental procedures, type of antibiotics prescribed, and ways of administration.

Results: The response rate was 52% (74 dentists, 27 dental hygienists). A proportion of 28% responders (28% dentists, 28% dental hygienists) would prescribe antibiotics to all children with CHD, while 7% (3% dentists, 28% dental hygienists) responded not to know the indications for the group's antibiotic prophylaxis. Regarding dental procedures, 12% of the dentists answered that all dental procedures acquire antibiotics (8% did not respond). The responses among the dentists regarding type of antibiotic they would prescribe, varied: 55.4% would prescribe Amoxicillin, 1.4% Clindamycin, 24.3% Amoxicillin/Clindamycin, 4.1% Penicillin V, 2.7% said they did not know (no-response: 12.2%).

Conclusions: The study indicates that a large proportion of dentists and dental hygienists are not familiar with national and international guidelines for antibiotic prophylaxis among children with CHD. This may cause unnecessary use of antibiotics during dental treatment and lack of prophylactic treatment when required. Such a situation might increase the possibility of developing allergic reactions and antibiotic resistance.

O19-174

Dental anxiety in children with special needs *versus* healthy controls

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Aim: To compare dental anxiety (DA) in children with special needs (CSN) with healthy controls and to identify relationships between parental and children's DA.

Design: Participants were patients aged 8–18 years receiving routine dental treatment in a University Pediatric dental clinic, and their parents. The experimental group were dyads of CSN and their parents while the control group were healthy children along with their parents. Interviews were conducted with participants using the Children's-Fear-Survey-Schedule-Dental-Subscale (CFSS-DS) to assess dental anxiety. Using the Frankl's rating, the dentist's record of child's behavior during dental treatment was noted.

Results: One hundred and sixty-five child-parent pairs participated in the study; 105(64%) were CSN, 60(36%) were healthy and their mean ages were 11 years respectively. No significant differences were found between the CFSS-DS scores of healthy children and CSN. Healthy children were afraid of choking and attending hospitals and less fearful of injections while CSN were mostly afraid of dental injections and less fearful of hospitals. Overall a significant correlation was found between age and anxiety; older children had less anxiety ($P = 0.013$). Children with higher Frankl ratings had lower dental anxiety as expressed by their CFSS-DS scores ($P = 0.003$). There was no correlation between the CFSS-DS scores of parents and their children with special needs or good health.

Conclusion: This study suggests that no differences existed between dental anxiety in healthy children and children with special healthcare needs. Furthermore no associations were found between parental and children's dental anxiety in this population.

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Oral Session O20/Dental Trauma 3

O20-175

Use of removable splint in the treatment of condylar fracture in children and adolescents

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Background: Paediatric fracture of mandibular condyle is the most common type of mandibular fracture, in children. If not properly managed, it may give rise to serious growth problems. However till now, there is lack of an agreed protocol for the treatment of condylar fractures in children.
Aim: To evaluate the effect of removable splint on the treatment of condylar fracture in children and adolescents.
Design: Twenty-five children 3–16 years old suffered condylar fracture were treated with removable splint for 1–3 months according to the developmental stage of the mandible and the degree of condyle dislocation. Functional exercises started at 2 weeks after the injury. Follow-up was carried out by clinical observation and panoramic image.
Results: The follow-up period varied from 6-month to 4 years. Clinical satisfactory results were obtained in all the patients with good occlusion, unimpaired function and normal growth and development of the mandibles. Panoramic image showed reconstruction of the fractured condyles, which were flattened and short.
Conclusions: Removable splint is useful in treating condylar fracture in children and adolescents.

O20-176

Mitochondria mediated apoptotic cell death in human periodontal ligament cells in storage medium: the pharmacological window of propolis

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Background: The damage to the attachment apparatus during an avulsion injury is unavoidable, so maintaining the viability of the periodontal ligaments attached to the avulsed tooth is critical. Propolis, a natural resin having polypharmacological window, has been documented as one among the best storage media for the purpose. However, the molecular insights of the therapeutics of propolis are poorly understood.
Aim: To investigate anti-apoptotic activity of propolis in cultured human periodontal ligament (hPDL) cells.
Design: Cells were exposed to Hank's balanced salt solution (HBSS) for 1–6 h. Parallel sets were exposed to propolis (10%) under identical conditions. Cells growing in culture medium were served as basal control. Altered levels of expression (mRNA and protein) and activity of apoptosis markers were studied.
Results: HBSS significantly induces reactive oxygen species, lipid-peroxide, and ratio of glutathione disulfide/reduced glutathione in time dependent manner. With increasing exposures, expression of Caspase-3/9, Bax, P^{53}, P^{21}, Puma, and cytochrome-*c* were significantly upregulated, whereas the levels of Bcl_2, Bclw, and Mcl_1 were downregulated. TUNEL assay, DNA laddering, and micronuclei induction show that longer HBSS exposure decreases the apoptosis due to increased necrosis. Translocation of Bax and cytochrome-*c* proteins between cytoplasm and mitochondria confirmed the role of P^{53} and Puma in mitochondrial membrane permeability. Mitochondria mediated apoptosis induction was confirmed by increased activity of caspases.
Conclusion: Our data demonstrates the mechanisms involved in HBSS induced apoptosis and antiapoptotic activity of propolis in hPDL. Thus, the applicability of propolis for PDL protection can be suggested during extra alveolar period.

O20-177

Training medical doctors to manage dentoalveolar trauma

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Introduction: A variety of specialities manage dentoalveolar trauma. Convention and wisdom expects the treating clinician to be dentally trained. However this is not always possible and, either by design or default, we can be found to be reliant on our medical doctor colleagues.
Report: Scotland has a population of 5 million people, with a density of $>1000/km^2$ in the four main cities but as low as $0–9/km^2$ in northern and island regions. Approximately 3300 dentists are employed in Scotland. Access to Scotland's dental workforce can be complicated by geographical location and the time and day of need. 'Out of hours' (OOH) dental access is considered by most providers to be outwith the standard working week of Monday to Friday 9 am–5 pm. Current guidelines require patients to be seen within pre-defined time-frames, including the need for treatment within 1 h for dental emergencies including avulsion. Paediatric Dentists and Oral and Maxillofacial Surgeons (OMFS) have lobbied for this service to be optimised by being specialist led and delivered, but without success. Groups of Paediatric Dentists and OMFS surgeons have begun trialing the delivery of dental trauma training to mainland Accident and Emergency (Emergency Room) and island based Medical Access Centre medical staff. This has used a well received combination of didactic lectures and hands-on teaching.
Comments: Where geographical, service or political constraints disallow the delivery of optimal care for dentoalveolar trauma by dentally trained staff, programmes of training for medically qualified staff may provide an alternative to conventional practice.

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O20-178

Inducing apical barrier in fractured nonvital immature permanent incisors using single calcium hydroxide($CaOH_2$) dressing- a case report

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Introduction: The open apex in traumatic immature permanent teeth, makes endodontic treatment difficult, this is due to the apical stop against which the filling can be packed and condensed. Thus closure of root apex is very essential for success endodontic treatment. Although different materials are used for the apexification procedure. Calcium hydroxide apexification is the most common treatment for necrotic, immature permanent teeth. There are different opinions regarding frequency of $CaOH_2$ dressing change to induce complete closure of the apex. Hence aim of this article is to report the successful closure of root apex in necrotic pulp permanent incisors with wide open apexes in a pediatric patient, using single injected $CaOH_2$ dressing.
Case report: Result of this case report indicated that apical stop is created with single visit apexification. One step $CaOH_2$ dressing is enough for apical barrier formation. Radiologic examination after 5 months showed that the apexes of the maxillary incisors are completed by newly formed tissue.
Comments: In spite of success in apical barrier formation by single visit Calcium hydroxide dressing, long-term follow-up of these teeth is necessary. Problems such as failure to control infection, recurrence of infection and cervical root fracture may occur. So it needs more number of teeth with long-term follow-up.

O20-179

Immediate implant intrasocket placement and provisionalization of terminally traumatized teeth in the esthetic zone in adolescents and young adults

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Introduction: Dental trauma in adolescents and young adults in many occasions involves the unfortunate incident of root fracture of a tooth in the esthetic zone that demands its extraction and restorative replacement. A dental implant restoration can be the treatment of choice for such cases. Considerations related to the age and growth level of the patient, the amount of the surgical hard and soft tissue intervention that an esthetic outcome requires along with its long term questionable stability, often lead to the postponement of the implant therapy for a later age.
Case report: The present report of 10 cases involves the immediate extraction implant restorative management of terminally traumatized teeth in the esthetic zone in adolescents and young adults (>17 years old). One stage immediate intrasocket implant placement without flap elevation was followed by immediate provisionalization. Successful short and long term (>5 years) preservation of the preoperative soft tissue marginal configuration was witnessed and documented regarding its labial and interproximal height in healthy and intact sites as well as in compromised sites. Long term volumetric evaluation confirmed the presence of labial bone supporting the soft tissues. The labial root eminence volume however in some occasions presented an under-contoured profile.
Comments: The flapless one stage immediate implant tooth replacement can be thought as a valid restorative alternative treatment even for young patients. The reduced amount of surgical intervention and surgical trauma is positively accepted while the preservation of the soft tissue marginal height ensures a highly acceptable long term esthetic outcome.

O20-180

A case of premature teeth exfoliation in a 5 year old boy

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Introduction: Premature loss of deciduous teeth has a complex aetiology. This can be hereditary as in chronic and cyclic neutropenia, dentine dysplasia, hypophosphatasia, hypophosphatemic vitamin D resistant rickets, Chediak- Higashi, Lesch-Nyhan, and Papillon-Lefevre syndromes or acatalasia. Possible sequelae from early loss of the primary teeth includes ectopic eruption of the permanent teeth, loss of masticatory function, and compromised aesthetics. Thorough investigation and assessment of the patients are crucial, in order to reveal the underlying causes.
Case report: We present a case of a 5 year 4 month old Caucasian male who was referred for specialist opinion to The University Dental Hospital, Cardiff, UK by his Community dental officer, following premature exfoliation of his primary dentition. The patient had first been seen by the Community dental officer at age 4 when he had already his primary maxillary central incisors; maxillary left first molar and mandibular right lateral incisor and first molar. The patient's oral hygiene was moderate. Appropriate medical referrals were made to help ascertain the cause of the premature exfoliation and rule out any undiagnosed underlying medical condition.
Comments: More localized dental causes also need to be excluded and the patient is currently undergoing further investigations to attempt to arrive at a diagnosis and plan for his future as his secondary dentition develops. The patient was placed on 6-month recall appointment to review his oral hygiene and monitor his growth and development.

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Oral Session O21/Special Needs Patients 3 – Oral Pathology 2

O21-181

PFAPA syndrome in a paediatric patient: a case report

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Introduction: PFAPA (periodic fever, aphthous stomatitis, pharyngitis, adenitis) syndrome belongs to autoinflammatory diseases and is more frequent in children under 5 years old. It is characterized by short-term recurrent episodes for a period of several years. Although the precise etiopathogenesis of the disease is unknown, malfunction or delayed maturation of the immune system and elevated levels of stress have been implicated. Diagnosis requires exclusion of other periodic fever diseases.
Case report: A 15 years old female patient presented with a chief complaint of periodic appearance of painful 'sores' in various parts of the mouth over the past 4 years. Each episode lasted 7–10 days and was accompanied by fever (39–40°C). Also, during the outbreak of the episodes, swelling of submandibular lymph nodes, dysphagia and pharyngitis occurred. Blood tests revealed slight leykocytosis and elevated levels of C-reactive protein. Based on the combination of history, clinical features and laboratory findings, a final diagnosis of PFAPA syndrome was rendered. Systemic corticosteroid treatment resulted in immediate response. Prophylactic treatment with cimetidine was administered for 6 months resulted in lack of recurrent episodes during the follow-up period.
Comments: PFAPA syndrome should be included in the differential diagnosis of children with recurrent aphthous ulcers accompanied by periodic fever. The persistent recurrent nature of the condition may compromise patients' quality of life and necessitates appropriate intervention with implementation of adequate preventive measures.

O21-182

Best clinical practice guideline: dental care of patients with Epidermolysis Bullosa

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Background: Epidermolysis Bullosa (EB) is a rare disease with multiple oral manifestations requiring a special approach from the dentist. The scientific literature is scarce, making it difficult for dentists with no experience on EB to know how to approach patients in a safe manner. The present guideline has been developed using a standard methodology.
Aim: Provide the users with information on patients with EB before, during and after dental treatment.
Design: A systematic review of the literature was performed. The information gathered was discussed at a 2 day consensus meeting including dentists from different countries and patient representatives. To formulate the recommendations the SIGN system was used. The draft document was sent for external review to dental professionals and patient groups.
Results: Key recommendations include: A preventive protocol is the dental management approach of choice. Patients with EB should be referred to the dentist for the first consultation at the age of 3–6 months. A dietary caries-prevention programme should be instigated at early age. Patients with the severe generalized RDEB subtype of EB require the most treatment modifications. Extreme care of fragile tissues is important: little pressure (compressive forces) can be applied, but no sliding movements should be used. Lips should be lubricated before any procedure is performed. Bullae occurring during treatment need to be drained to avoid spreading. Sutures can be used safely in all patients.
Conclusions: This guideline will help dentists treating patients with EB to provide safe and evidence based treatments.

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O21-183

Atlanto-occipital instabilities and cardiopathies in Down Syndrome

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Background: Down's syndrome (trisomy 21) is the most common chromosomal abnormality that is compatible with life. These patients are of special concern because of their associated problems with regard to congenital heart diseases, gastrointestinal conditions, respiratory and other health issues including oral health problems like dental caries, periodontal diseases, tooth anomalies, facial trauma and injury. These patients often require comprehensive dental care under general anesthesia. Atlantoaxial (C-1, C-2) instability has not attracted general attention because clinical manifestations are rare and the condition is limited to a small portion of the population. Though the incidence of patients with atlantoaxial instability is less, they pose challenges to the anesthegiologist because of their unique set of problems, like subluxation or dislocation of C-1 and C-2 and injury of the spinal cord. This is a rare but serious complication.
Aim: To find out the incidence of atlanto-occipital instability and cardiopathies among children diagnosed with Down syndrome.
Design: Prospective Observational Study. Forty children belonging to both genders who were diagnosed and referred from the Department of Pediatrics, Institute of Child Health, Medical College, Kottayam to Department of Pediatric dentistry were included in the study. Roentgenographic study and echocardiogram was done to diagnose children for atlanto-occipital instability and cardiopathy respectively.
Results: The results show 12 out of 46 children with atlanto-occipital instability, which is statistically highly significant ($P \leq 0.01$) in our study. The incidence of cardiopathy among these children were 20, which is again highly significant. There was no significant difference between the genders.
Conclusion: The provision of dental services to the person with Down Syndrome presents unique challenges to the dental staff. A thorough knowledge of the unsual medical and dental implications of this syndrome and an innovative problem solving approach to treatment planning and preventive procedures will do much to alleviate the dental effects of this handicapping condition.

O21-184

Multi disciplinary approach in the management of Ectodermal dysplasia

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Introduction: Ectodermal dysplasias are a clinically and genetically heterogeneous group of more than 120 syndromes involving two or more ectodermally derived structures. Of these, only 30 forms have been studied at a molecular level. The wide range of clinical features observed in various forms of Ectodermal dysplasia makes diagnosis and treatment planning a complicated process.
Case Reports: Diagnosis and treatment planning of two cases of Ectodermal dysplasia is discussed to show the importance of multidisciplinary approach in the management of this condition. Hypohidrotic Ectodermal dysplasia is a major form of Ectodermal dysplasia exhibiting hypodontia, small hair growth, intolerance to heat, frontal bossing and etc. Clinical and radiographic features and treatment plan of a child with hypohidrotic Ectodermal dysplasia is described. Another variant of Ectodermal dysplasia is Witkop tooth and nail syndrome. This condition is characterized by hypodontia and nail dysplasia. Heat tolerance and sweating are normal. The clinical & radiographic features of a mother and child presenting with this rare condition are described.
Comments: An understanding of the psychosocial status of the patient with Ectodermal dysplasia is crucial since the unaesthetic appearance that accompanies the syndrome often has a negative psychological effect on the patient. Poor self image, peer pressure and school or job related discrimination have been directly related to psychological scarring experienced by these patients. Early intervention and well-planned multidisciplinary approach is required to manage the orofacial disfigurement and to afford the patient some measure of confidence.

O21-185

Treatment of retinoblastoma leading to dental malformation: report of a case

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Introduction: Retinoblastoma is the most frequently occurring primary intraocular malignant tumor in children. It can affect one or both eyes and the disease can be inherited. Children with the heritable form of retinoblastoma are at high risk for developing subsequent malignancies, most commonly sarcomas. Early detection of retinoblastoma is important for the chance of survival, the visual prognosis and preservation of the eye. The choice of treatment is based on the risk of metastases, the diameter and the location of the tumor, the age of the patient, the heredity and the visual prognosis. Nowadays, treatment consists of a combination of techniques like Enucleation, laser therapy, cryotherapy, systemic chemotherapy and laser hyperthermia. Chemotherapy therapy can cause multiple cosmetic and functional abnormalities of the dentition, most predominantly in children treated before the age of 3 that their developed deciduous dentition has not yet developed.
Case report: This case reports a very rare & unique occurrence of *microdontia* in all the first premolars in a 8 year old girl who has undergone treatment for unilateral retinoblastoma. The child was diagnosed with the condition at the age of 1 year following which she has undergone multiple chemo & cryo therapy sessions resulting in complete regression of the tumor & loss of vision in the right eye.
Comments: Rare and unique occurrence of microdontia in all permanent first premolars.

O21-186

Strategies of oral health education in children with special needs

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Introduction: This work focused on the Promotion of the oral health for children with intellectual disability. The Special Care Unit develops activities such as strategies of prevention and dental treatment and postgraduate education and research in collaboration with the University of Buenos Aires. Oral health in those children is significantly poorer than that of other groups. Those at the highest risk must be identified early. Our philosophy promote the children's inclusion to receive comprehensive care in a

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traditional dental setting over a lifetime, using noninvasive, behavioral support techniques in order to avoid the need for general anesthesia

Aim: The objective is to develop educational programs in Preventive Dentistry issues to emphasize improvement of oral hygiene, providing children, parents, caregivers and teachers information and tools, using creative methods to guide children to accept dental care The Preventive program is applied to a.patients and their parents/caregivers who are attending the Special Care Unit, b. The special staff of teachers and Pupils with intellectual disability of the Special School Macromodels –toys, layouts and videoclips- allows opportunities to provide a glad and relaxed atmosphere. Clinical behavior-management issues are described. The importance of a warm dental office's environment and appointment structure on a ASD patient are presented.

Conclusions: For children with intellectual disorders, the practice of oral care may become a challenge. Supported oral care intervention is essential. Professional awareness is something to be wished and also behavioral modification by an oral health special training program makes an important contribution to the ongoing clinical process.

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