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ABSTRACT

The salivary pellicle is a thin acellular organic film that forms on any type of surface upon exposure to saliva. The role of the pellicle is manifold, and it plays an important role in the maintenance of oral health. Its functions include not only substratum protection and lubrication, but also remineralization and hydration. It also functions as a diffusion barrier and possesses buffering ability. Not only the function, but also the formation, composition and stability of the pellicle are known to be highly influenced by the physicochemical properties of both substrata and ambient media. In this chapter, we discuss these aspects of salivary pellicles, an area where research has boomed in the past years partly because of the application of experimental techniques often reserved for more traditional surface science studies.

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Influence of substratum hydrophobicity on salivary pellicles: organization or composition?

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ABSTRACT

Different physico-chemical properties (e.g., adsorption kinetics, thickness, viscoelasticity, and mechanical stability) of adsorbed salivary pellicles depend on different factors, including the properties (e.g., charge, roughness, wettability, and surface chemistry) of the substratum. Whether these differences in the physico-chemical properties are a result of differences in the composition or in the organization of the pellicles is not known. In this work, the influence of substratum wettability on the composition of the pellicle was studied. For this purpose, pellicles eluted from substrata of different but well-characterized wettabilities were examined by means of sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). The results showed that substratum hydrophobicity did not have a major impact on pellicle composition. In all substrata, the major pellicle components were found to be cystatins, amylases and large glycoproteins, presumably mucins. In turn, interpretation of previously reported data based on the present results suggests that variations in substratum wettability mostly affect the organization of the pellicle components. © 2014, © 2014 Taylor & Francis.

Published in Biofouling Volume 30 Issue 9 DOI 10.1080/08927014.2014.974155
Antioxidant and gelatinolytic activities of papain from papaya latex and bromelain from pineapple fruits

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ABSTRACT

Papain and bromelain, the protease enzymes from papaya (Carica papaya) latex and pineapple (Ananas comosus) fruits were extracted and purified by the simple precipitation method, with the percentage yields of 16.76 and 0.97%w/w and the molecular weight of 23 and 25 kDa as same as their standards, respectively. The standard papain exhibited higher free radical scavenging activity than the standard bromelain of 400 times. The extracted papain gave lower free radical scavenging activity than the standard papain of 560 times. Both the standard and extracted papain inhibited the lipid peroxidation similar to the standard vitamin C and E, while both the standard and extracted bromelain did not show this activity. All protease enzymes at 25 µg/ml did not only show any cytotoxicity by the sulforhodamine B assay, but exhibited an interesting relative MMP-2 stimulation by zymography on human skin fibroblasts. The extracted papain gave the highest MMP-2 stimulatory activity at 2.10±0.1 folds of the control which were higher than the standard papain, the standard and extracted bromelain of 1.04, 1.31 and 1.24 times, respectively. This study has suggested that the extracted papain from plant can be further developed for the treatment of keloids and hypertrophic scars.

Published in Chiang Mai Journal of ScienceVolume 41Issue 3Doi
Periodontal disease in Thai patients with rheumatoid arthritis

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ABSTRACT

Aim: To evaluate the prevalence and severity of periodontal disease in patients with rheumatoid arthritis (RA) who attended a rheumatology clinic in a university hospital. Methods: All consecutive patients with RA who attended the rheumatology clinic between June 2009 and January 2010 were asked to enroll in this study. All participants answered questionnaires, which included demographic data, medical history, medications used and smoking habits. A full mouth periodontal examination, including gingival index, plaque index, probing pocket depth and clinical attachment level was performed. Only cases that had at least 20 teeth were included in this study. Rheumatoid arthritis parameters, including number of tender and swollen joints, erythrocyte sedimentation rate, the presence of rheumatoid factor (RF), hand radiographs, Disease Activity Index (DAS) and health status using the Thai Health Assessment Questionnaire (HAQ), were determined. The association between RA parameters and periodontal condition was examined. Results: There were 196 participants (87.2% female) with a mean age of 51.7 ± 9.70 years, mean disease duration of 9.62 ± 7.0 years and mean DAS score of 4.64 ± 1.25. Eighty-two per cent were RF-positive. Moderate and severe periodontitis were found in 42% and 57%, respectively. Higher age, male gender, previous or current smoking and high level of plaque score were associated with severe periodontal disease. No differences in RA parameters were found between groups of patients who had moderate and severe periodontitis. Conclusions: We found a high prevalence of periodontitis in Thai patients with RA. However, there was no association between RA parameters and periodontal conditions. © 2014 Asia Pacific League of Associations for Rheumatology and Wiley Publishing Asia Pty Ltd.
ClC-7 expression levels critically regulate bone turnover, but not gastric acid secretion

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ABSTRACT

Mutations in the 2Cl-/1H+-exchanger ClC-7 impair osteoclast function and cause different types of osteoclast-rich osteopetrosis. However, it is unknown to what extent ClC-7 function has to be reduced to become rate-limiting for bone resorption. In osteoclasts from osteopetrosis patients expression of the mutated ClC-7 protein did not correlate with disease severity and resorption impairment. Therefore, a series of transgenic mice expressing ClC-7 in osteoclasts at different levels was generated. Crossing of these mice with Clcn7-/- mutants rescued the osteopetrotic phenotype to variable degrees. One resulting double transgenic line mimicked human autosomal dominant osteopetrosis. The trabecular bone of these mice showed a reduction of osteoblast numbers, osteoid, and osteoblast marker gene expression indicative of reduced osteoblast function. In osteoclasts from these mutants ClC-7 expression levels were 20 to 30% of wildtype levels. These reduced levels not only impaired resorptive activity, but also increased numbers, size and nucleus numbers of osteoclasts differentiated in vitro. Although ClC-7 was expressed in the stomach and PTH levels were high in Clcn7-/- mutants loss of ClC-7 did not entail a relevant elevation of gastric pH. In conclusion, we show that in our model a reduction of ClC-7 function by approximately 70% is sufficient to increase bone mass, but does not necessarily enhance bone formation. ClC-7 does not appear to be crucially involved in gastric acid secretion, which explains the absence of an osteopetrorickets phenotype in CLCN7-related osteopetrosis. © 2013 Elsevier Inc.
Garlic extract attenuates brain mitochondrial dysfunction and cognitive deficit in obese-insulin resistant rats

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ABSTRACT

Oxidative stress in the obese-insulin resistant condition has been shown to affect cognitive as well as brain mitochondrial functions. Garlic extract has exerted a potent antioxidant effect. However, the effects of garlic extract on the brain of obese-insulin resistant rats have never been investigated. We hypothesized that garlic extract improves cognitive function and brain mitochondrial function in obese-insulin resistant rats induced by long-term high-fat diet (HFD) consumption. Male Wistar rats were fed either normal diet or HFD for 16 weeks (n = 24/group). At week 12, rats in each dietary group received either vehicle or garlic extract (250 and 500 mg·kg⁻¹·day⁻¹) for 28 days. Learning and memory behaviors, metabolic parameters, and brain mitochondrial function were determined at the end of treatment. HFD led to increased body weight, visceral fat, plasma insulin, cholesterol, and malondialdehyde (MDA) levels, indicating the development of insulin resistance. Furthermore, HFD rats had cognitive deficit and brain mitochondrial dysfunction. HFD rats treated with both doses of garlic extract had decreased body weight, visceral fat, plasma cholesterol, and MDA levels. Garlic extract also improved cognitive function and brain mitochondrial function, which were impaired in obese-insulin resistant rats caused by HFD consumption. © 2014 National Research Council of Canada. All rights reserved.
Enamel-renal-gingival syndrome and FAM20A mutations

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ABSTRACT

The enamel-renal syndrome of amelogenesis imperfecta (AI) and nephrocalcinosis, and the amelogenesis imperfecta-gingival fibromatosis syndrome have both been associated with mutations in FAM20A. We report on two unrelated Thai patients with three novel and one previously reported mutations in FAM20A with findings suggesting both disorders, including hypoplastic AI, gingival fibromatosis, unerupted teeth, aggressive periodontitis, and nephrocalcinosis/nephrolithiasis. Additional findings consisted of a supernumerary premolar, localized aggressive periodontitis, thin alveolar bone, vitamin D deficiency-associated hyperparathyroidism, and heterotopic calcification in other tissues, including lungs, dental pulp, gingiva, dental follicles, and periodontal tissues, and early cessation of limited menstruation. Greater promotory activity of urine on calcium oxalate crystal growth compared to controls may help to explain the pathogenesis, and suggest that FAM20A mutations can contribute to nephrocalcinosis/nephrolithiasis. Our findings expand the phenotypic spectrum of FAM20A mutations. Since both of our patients and a large number of previously reported cases had all the important features of both syndromes, including AI, renal anomalies, and gingival fibromatosis, we are convinced that these two disorders actually are the same entity. The name of enamel-renal-gingival syndrome is suggested. © 2013 Wiley Periodicals, Inc.
Tricho-odonto-onycho-dermal dysplasia and WNT10A mutations

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ABSTRACT

We report on three novel (IVS2+1G>A splice site, c.1066G>T, and c.1039G>T, and one previously reported (c.637G>A) WNT10A mutations in three patients affected with odonto-onycho-dermal dysplasia (OODD; OMIM 275980). OODD is a rare form of autosomal recessive ectodermal dysplasia involving hair, teeth, nails, and skin, characterized by hypodontia (tooth agenesis), smooth tongue with marked reduction of filiform and fungiform papillae, nail dysplasia, dry skin, palmoplantar keratoderma, and hyperhidrosis of palms and soles. The novel IVS+1G>A splice site mutation is predicted to cause significant protein alteration. The other novel mutations we found including c.1066G>T and c.1039G>T are predicted to cause p.Gly356Cys and p.Glu347X, respectively. Barrel-shaped mandibular incisors and severe hypodontia appear to be associated with homozygous or compound heterozygous mutations of WNT10A. The name "tricho-odonto-onycho-dermal dysplasia" is suggested to replace "odonto-onycho-dermal dysplasia" because hair anomalies including hypotrichosis and slow-growing hair have been reported in numerous reported patients with this syndrome. © 2014 Wiley Periodicals, Inc.
Favorable interleukin-8 induction in human gingival epithelial cells by the antimicrobial peptide LL-37

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ABSTRACT

Results: Out of eleven Th1/Th2 cytokines tested, treatment of HGECs with non-toxic doses of LL-37 (2-6 ?M) significantly raised only IL-8 levels in the cell-free culture supernatants, when compared to control untreated cells (P
Positive correlations between hCAP18/LL-37 and chondroitin sulphate levels in chronic periodontitis

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ABSTRACT

Aim To measure the levels of hCAP18/LL-37 in gingival crevicular fluid from patients with periodontal diseases compared with healthy controls and to determine the correlation between hCAP18/LL-37 and chondroitin sulphate (CS) levels in patients with periodontitis. Material and Methods Gingival crevicular fluid samples from 51 patients and 25 healthy volunteers were analysed for the hCAP18/LL-37 levels by immunoblotting and were determined for the CS levels by the competitive enzyme-linked immunosorbent assay. Results Tris buffer pH 9.85 was selected to recover hCAP18/LL-37 from Periopaper strips, in which the percentages of recovery were around 70%. The median levels of hCAP18/LL-37 in the aggressive and the chronic periodontitis (CP) groups were significantly greater than those in the gingivitis and the healthy groups (p...
WNT10A mutations also associated with agenesis of the maxillary permanent canines, a separate entity

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ABSTRACT

Agenesis or isolated hypodontia of the maxillary permanent canines is a very rare dental anomaly. We report on nine unrelated Thai patients with this condition. Three of them had one affected parent. Three heterozygous missense mutations (p.Arg171Cys; p.Gly213Ser; and IVS2+1G>A) were identified in WNT10A in six patients. The p.Gly213Cys mutation was found in four patients. One of the patients who had p.Gly213Ser mutation also had peg-shaped (microdontia of the) maxillary lateral incisors with dens invaginatus. The mothers of two patients who carried the same mutation as their affected sons (p.Gly213Ser and p.Arg171Cys) had microdontia of the maxillary permanent lateral incisor. Our study has demonstrated for the first time that agenesis of the maxillary permanent canines is a distinct entity, associated with mutations in WNT10A. Inheritance appears to be autosomal dominant. Agenesis of the maxillary permanent canines may accompany by microdontia of the maxillary permanent lateral incisors and dens invaginatus of the maxillary permanent lateral incisors. Mutations could not be identified in the coding exons of WNT10A in three patients. They might be located outside the coding exons, including the promoter regions. However, it is likely that agenesis of the maxillary permanent canines is a heterogeneous disorder. © 2013 Wiley Periodicals, Inc.
Comparisons of the chondroitin sulphate levels in orthodontically moved canines and the clinical outcomes between two different force magnitudes

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ABSTRACT

The aims of this study were to compare the chondroitin sulphate (CS) levels in gingival crevicular fluid (GCF) of moved canines using either 70 or 120g of orthodontic force, and to compare the rate of tooth movement and the amount of pain between these two force magnitudes. Sixteen patients (6 males and 10 females; aged 16.91±2.99 years), with class I malocclusion, who required orthodontic treatment with first premolar extractions, were recruited. The force magnitudes used to move the maxillary canines distally were controlled at 70 and 120g on the right and the left sides, respectively. GCF samples were collected with Periopaper® strips before and during orthodontic tooth movement. Competitive ELISA with monoclonal antibody was used to measure the CS levels. The distance of tooth movement and the amount of pain assessed by visual analog scale (VAS) scores were evaluated. The medians of CS levels during the loaded period were significantly greater than those during the unloaded period (P < 0.05). The differences between the medians of CS levels of 70g and 120g retraction force during each 1 week period were not significant. There was no significant difference in the rates of canine movement between these two force magnitudes. However, using 120g, the medians of VAS scores were significantly greater than those with 70g (P < 0.05). Collectively, 70g retraction force appears to be sufficient and more suitable than 120g force as it causes no difference in biochemically-assessed bone remodelling activity, the same rate of tooth movement, reduced pain and better comfort. © 2013 © The Author 2013. Published by Oxford University Press on behalf of the European Orthodontic Society. All rights reserved.
Salivary pellicles

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ABSTRACT

The salivary pellicle is a thin acellular organic film that forms on any type of surface upon exposure to saliva. The role of the pellicle is manifold, and it plays an important role in the maintenance of oral health. Its functions include not only substratum protection and lubrication, but also remineralization and hydration. It also functions as a diffusion barrier and possesses buffering ability. Not only the function, but also the formation, composition and stability of the pellicle are known to be highly influenced by the physicochemical properties of both substrata and ambient media. In this chapter, we discuss these aspects of salivary pellicles, an area where research has boomed in the past years partly because of the application of experimental techniques often reserved for more traditional surface science studies. © 2014 by S. Karger AG, P.O. Box, CH-4009 Basel (Switzerland). All rights reserved.
Comparisons between two biochemical markers in evaluating periodontal disease severity: A cross-sectional study

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ABSTRACT

Background: The purpose of this study was to compare two biochemical markers, which have been previously used to determine the degrees of alveolar bone destruction, in evaluating periodontal disease severity.

Methods: The WF6 epitope of chondroitin sulfate (CS) and the alkaline phosphatase (ALP) levels were determined in gingival crevicular fluid (GCF) samples collected from patients with various degrees of disease severity, including ten patients with gingivitis (50 gingivitis sites) and 33 patients with chronic periodontitis (including gingivitis, slight, moderate, and severe periodontitis sites; n = 50 each), as well as from ten healthy volunteers (50 healthy sites) by Periopaper strips. The levels of CS and ALP were measured by an ELISA and a fluorometric assay, respectively.

Results: The results demonstrated low levels of CS and ALP in non-destructive and slightly destructive periodontitis sites, whereas significantly high levels of these two biomolecules were shown in moderately and severely destructive sites (p < 0.05). Although a significant difference in CS levels was found between moderate and severe periodontitis sites, no difference in ALP levels was found. Stronger correlations were found between CS levels and periodontal parameters, including probing depth, loss of clinical attachment levels, gingival index and plaque index, than between ALP levels and these parameters.

Conclusions: It is suggested that the CS level is a better diagnostic marker than the ALP level for evaluating distinct severity of chronic periodontitis.

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Associations between social inequality and tooth loss in a household sample of elderly Thai people aged ≥60 years old

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ABSTRACT

Objective: To assess the relationship between social inequality and the number of remaining teeth in an elderly Thai population. Background: Having twenty or more remaining teeth is an important indicator of optimal oral health in the elderly. Methods: The data for this study were derived from the Survey of Older Persons in Thailand, conducted by the National Statistical Office, based on face-to-face interviews with people aged ≥60. The total sample was 30,427. The oral health measure was self-reported remaining number of teeth. Income, education and possession of durable goods were utilised as measures of social inequality. Results: More than half of the sample (57.0%) was women. The majority (73.2%) was in the age range 60-74 years old. Less than a fifth (15.5%) had 7 or more years of education. A third earned
Combined vildagliptin and metformin exert better cardioprotection than monotherapy against ischemia-reperfusion injury in obese-insulin resistant rats

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Background: Obese-insulin resistance caused by long-term high-fat diet (HFD) consumption is associated with left ventricular (LV) dysfunction and increased risk of myocardial infarction. Metformin and vildagliptin have been shown to exert cardioprotective effects. However, the effect of these drugs on the hearts under obese-insulin resistance with ischemia-reperfusion (I/R) injury is unclear. We hypothesized that combined vildagliptin and metformin provide better protective effects against I/R injury than monotherapy in obese-insulin resistant rats.

Methodology: Male Wistar rats were fed either HFD or normal diet. Rats in each diet group were divided into 4 subgroups to receive vildagliptin, metformin, combined vildagliptin and metformin, or saline for 21 days. Ischemia due to left anterior descending artery ligation was allowed for 30-min, followed by 120-min reperfusion. Metabolic parameters, heart rate variability (HRV), LV function, infarct size, mitochondrial function, calcium transient, Bax and Bcl-2, and Connexin 43 (Cx43) were determined. Rats developed insulin resistance after 12 weeks of HFD consumption. Vildagliptin, metformin, and combined drugs improved metabolic parameters, HRV, and LV function. During I/R, all treatments improved LV function, reduced infarct size and Bax, increased Bcl-2, and improved mitochondrial function in HFD rats. However, only combined drugs delayed the time to the first VT/VF onset, reduced arrhythmia score and mortality rate, and increased p-Cx43 in HFD rats. Conclusion: Although both vildagliptin and metformin improved insulin resistance and attenuate myocardial injury caused by I/R, combined drugs provided better outcomes than single therapy by reducing arrhythmia score and mortality rate. © 2014 Apaijai et al.