

Annual Publications 2002 - 2003



Faculty of Dentistry
The University of Hong Kong

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Dean Prof. F.C. Smales
Faculty of Dentistry

Preface

Once again the Faculty of Dentistry of the University of Hong Kong shows its commitment to research excellence in this Annual Research Report for the period 2002 - 2003. The range and depth of research presented is impressive, yet nevertheless it is focussed on principle themes within four Interdisciplinary Research Groups.

This year, during a Strategic Planning Week, the Faculty uncompromisingly placed "Faculty of Dentistry HKU Discovery" as one of the major pillars of its Mission for the next few years.

By way of further explanation it is stated in the Faculty Strategic Plan document that the pursuit of that Mission will involve "The prosecution of cutting edge research which is relevant to the delivery of oral healthcare and the maintenance of oral health in the populations that the Faculty seeks to serve".

A more detailed exposition goes on to list current research strengths available in the Faculty for further development, and also desirable research areas not yet strong requiring further development.

I congratulate all involved in the production of this excellent report and all of those staff and students who have conducted the research projects that made the Report possible.



Professor FC Smales

Dean

25th November 2003

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Agee KL, Pashley EL, Itthagarun A, Sano H, Tay FR, Pashley DH. (2003) Submicron hiati in acid-etched dentin are artifacts of desiccation. *Dental Materials* 19, 60-68.

Abstract:

OBJECTIVES: The submicron hiatus represents a potential space between the base of the collagen network and the mineralized dentin when dentin is acid-etched for bonding. These spaces were observed in SEM studies after acid-etched dentin specimens were critical point dried or dehydrated in hexamethyldisilane. However, they have never been identified in TEM studies of dentin hybrid layers. This study critically examined the cause of submicron hiati formation using a silver staining technique to measure nanoleakage. **METHODS:** Two multi-step, total-etch adhesives (One-Step, Bisco; Single Bond, 3M) and two single-step, self-etching adhesives (Prompt L-Pop, ESPE; One-Up Bond F, Tokuyama) were examined. Flat dentin surfaces were bonded with these adhesives and a lining composite. In each adhesive group, 0.8mm thick slabs from the same bonded tooth were coated with nail varnish applied 1mm from the bonded interfaces. The varnish was either left to dry completely for 10min before immersing in 50wt% silver nitrate (AgNO

(3) for 24h (group D), or painted on blotted tooth slabs that were immediately dropped into the AgNO (3) solution (group M). After developing, undemineralized, unstained, epoxy resin-embedded sections were prepared for transmission electron microscopy (TEM) to identify the amount and distribution of silver uptake. **RESULTS:** Nanoleakage patterns were observed in all adhesive-bonded teeth, regardless of brand. Fine reticular silver deposits were also found in the underlying undemineralized dentin. In group D, submicron hiati were seen as tunnels of heavy silver deposits beneath hybrid layers. Specifically, a hiatus occurred between the undemineralized intertubular dentin and a cohesively fractured layer of the same matrix that was attached to the base of the hybrid layer. Hiati were completely absent in group M, regardless of the brand of adhesive. **SIGNIFICANCE:** Submicron hiati are artifacts created by desiccation during specimen processing, and should be referred to as such in future studies of bonded dentin interfaces.



Allen PF, McMillan AS. (2003) A longitudinal study of quality of life outcomes in older adults requesting implant prostheses and complete removable dentures. *Clinical Oral Implants Research* 14, 173-179.

Abstract:

A longitudinal clinical trial involving 103 subjects was undertaken to assess the impact of oral implant therapy on the psychosocial well-being of subjects with complete denture wearing problems. There were four experimental groups: (1) an implant group, where subjects were edentulous/edentate in one jaw and requested and received implants to retain an oral prosthesis (IG); (2) subjects edentulous/edentate in one jaw requesting implants but who received conventional dentures (CDG1); (3) edentulous subjects requesting replacement of their dentures by conventional means (CDG2); (4) dentate subjects requiring routine treatment, who were included for comparison. Data were collected in each group pre- and post-treatment using validated oral specific [the Oral Health Impact Profile (OHIP)], and generic (the SF36) health status measures. Subjects in IG, CDG1 and CDG2 also completed a denture satisfaction

scale. IG and CDG1 subjects reported that tooth loss and denture wearing problems had a much greater impact on their quality of life than subjects seeking conventional dentures. Dentate subjects had a much better oral health status compared with denture-wearing subjects. Following treatment, subjects who received implant-retained prostheses (IG) reported a significant improvement in satisfaction and health-related quality of life, as did subjects who requested and received conventional dentures (CDG2). Subjects who requested implants, but received conventional dentures (CDG1), reported little improvement in denture satisfaction and only modest improvement in their quality of life. None of the denture-wearing subjects reported health-related quality of life that was as good as that of dentate subjects. The findings have significant implications in the assessment of outcomes in future clinical trials.

Botelho MG, Chan AWK, Yiu EY, Tse ET. (2002) Longevity of two-unit cantilevered resin-bonded fixed partial dentures. *American Journal of Dentistry* **15**, 295-299.

Abstract:

PURPOSE: To examine the clinical performance of two-unit cantilevered resin-bonded fixed partial dentures that were inserted at The Prince Philip Dental Hospital, Hong Kong by students and staff between 1992 and 1998. **MATERIALS AND METHODS:** A search of the Hospital computer records system revealed a list of 130 patients who had received two-unit cantilevered resin-bonded fixed partial dentures (RBFPD) placed more than 24 months previous to the review date. For each patient clinically examined, the following data were recorded: gender, age, operator, cementation date, endodontic treatment if performed, bone support, tooth mobility, the presence of shimstock contacts on abutment or pontic in

intercuspal position, the presence of interproximal contacts adjacent to the prosthesis assessed by dental floss. Date of any debonds with subsequent treatment was recorded and the patient was asked qualitative questions about their prosthesis. **RESULTS:** 82 prostheses were placed in 69 patients and were found to have a mean service life of 36.7 +/- 15.4 months and a range of 4.3 months to 95.4 months. In total, four prostheses were reported to have debonded resulting in a clinical retention rate of 95.1%. No rotation, drifting or tipping was observed for any of the prostheses during the time of this study. Overall patients' satisfaction with RBFPDs was good with an average assessment rating of 8.2.



Botelho MG. (2003) Improved design of long-span resin-bonded fixed partial dentures: three case reports. *Quintessence International* **34**, 167-171.

Abstract:

When single-tooth implants are not appropriate, the use of resin-bonded fixed partial dentures is a preferred treatment option when the abutments are relatively sound. However, the use of resin-bonded fixed partial dentures (RBFPDs) for replacing two or more missing teeth is considered to have a guarded prognosis, as long-span RBFPDs have been shown to be less successful than single pontic prostheses. The use of properly modified nonrigid connectors may well improve the success of long-span RBFPDs by reducing harmful interabutment stresses that appear to be responsible for retainer debonding in long-span RBFPDs. For such long-span prostheses, it is advised that the major retainer have wraparound on at least three surfaces of the abutment or have strategi-

cally placed opposing axial grooves or slots. It is considered essential that the connector allow interabutment movement in both the horizontal and vertical planes so that the retainer with the greater resistance and retention form does not stress and possibly debond the minor retainer. The upside-down positioning of the nonrigid connector and the matrix incorporated with the major retainer is considered important for successful maintenance, if a debond should occur due to greater loading on the major retainer, because it can be removed and recemented easily. Clinical cases are described that replace two or more missing teeth using fixed-movable RBFPDs with nonrigid connectors.



Botelho MG. (2003) Inhibitory effects on selected oral bacteria of antibacterial agents incorporated in a glass ionomer cement. *Caries Research* **37**, 108-114.

Abstract:

The objectives of the study were to investigate the antimicrobial efficacy, over time, of combining antibacterial agents with a glass ionomer cement (GIC). This was assessed using an agar diffusion test. Chlorhexidine hydrochloride, cetylpyridinium chloride, cetrimide and benzalkonium chloride were added to Fuji IX GIC at 0, 1, 2 and 4% w/w. Antibacterial-GIC specimens were placed onto agar plates inoculated with one of six bacterial species (Streptococcus,

Lactobacillus, and Actinomyces, two each) and the area of inhibition calculated after 24 h incubation. The experiment was repeated weekly and at week 11 the surface of the specimen was abraded prior to replacing on inoculated agar plates. Control specimens of the GIC produced no bacterial inhibition. The antibacterial-GIC combination specimens showed significant inhibition which decreased at different rates over the test period. Resurfacing of the

specimens showed a dramatic increase of antibacterial action similar to levels produced on week 1. CT-GIC showed the greatest ($p < 0.005$) inhibitory effect throughout the experimental period for 4 out of 6 test bacteria. The addition of antibacterial agents to Fuji IX creates a GIC material with significant anti-

microbial action in vitro which is dependent on concentration and type of antibacterial agent, and appears to be associated primarily with a release of the antibacterial from the surface layer of the specimen.



Chan SC, Tsai JS, King NM. (2002) Feeding and oral hygiene habits of preschool children in Hong Kong and their caregivers' dental knowledge and attitudes. *International Journal of Paediatric Dentistry* **12**, 322-331.

Abstract:

OBJECTIVES: This study was designed to gather data on infant feeding habits and oral hygiene practices of Hong Kong preschool children, on the dental knowledge and attitudes of their caregivers and on the oral health status of the same group of children. **DESIGN:** Cross-sectional study. **SAMPLE AND METHODS:** Data was gathered for a total of 369 boys and 297 girls (207 1-year-olds, 269 2-year-olds and 190 3-year-olds) with a mean age of 20.19 (+/- 0.38) months. Information related to children attending six randomly selected Maternity and Child Health Centres. It was obtained by examining the children and by interviewing the attending caregivers and completing a questionnaire. Each child was given an oral examination using a torch, disposable mirror and wooden tongue spatula. **RESULTS:** Only 7% of the children were exclusively breast-fed. More than 98% (656/666) of infants used a nursing bottle for at least some drinks. Over 62% (411/656) had used a nursing bottle to take fluids other than water and infant formula. At bedtime, 56% (361/656) were given a nursing bottle prior to sleep and 96% (340/361) of these bottles contained formula milk. Of these children, only 37% (131/361) finished the contents of

the bottle before falling asleep. Over 73% (139/190) of the children continued to use a feeding bottle after 2 years of age. Non-nutritive sucking habits were practised by 35.6% (237/666) of the children. Visible plaque, on the labial surface of at least two maxillary incisors, was found in 19.5% (120/615) of the children. Oral cleansing habits were practised for 66.2% (441/666) of the children. Toothbrushing habits were reported for 42.3% (260/615) of the dentate children, of whom 19% (49/260) had their teeth brushed twice daily. Toothpaste was used by 49.23% (128/260) of the children and 57.3% (149/260) brushed their own teeth. Caries was seen in 7.6% of the infants (47/615). Of the caregivers, 67.7% said they did not think carious primary teeth needed to be restored. Among the mothers, 12.6% (43/342) did not know the oral condition of their child. Reportedly, 82% (417/510) and 87.5% (446/510) of the mothers had not received any oral health care information during the ante- or postnatal periods. Nearly all, 97%, of the respondents said that they would like to receive more information on oral health care.



Chay SH, Rabie ABM. (2002) Repositioning of the gingival margin by extrusion. *American Journal of Orthodontics and Dentofacial Orthopedics* **122**, 95-102.

Abstract:

In this case report, orthodontic intervention was used to move the gingival margin of a maxillary canine incisally by almost 9 mm to mimic a lateral incisor. Increasing the thickness of the labial plate of bone of the canine and subsequently increasing the thickness of the attached gingiva before extrusion prevented gingival recession at a later stage. In many situations,

orthodontic treatment can achieve results that could not be attained by restorations and other means of cosmetic dentistry, especially when dealing with gingival margins and gingival height. A step-by-step approach to achieving these treatment objectives is described.

Cheung GSP, Chan TK. (2003) Long-term survival of primary root canal treatment carried out in a dental teaching hospital. *International Endodontic Journal* **36**, 117-128.

Abstract:

AIM: This study aimed to examine clinically and radiographically the survival of primary root canal treatment completed in a dental teaching hospital between 10 and 20 years previously. METHODOL-
OGY: A data collection form was used to collate all information obtained from the written patients' records along with the results from clinical and radiographic examination of 608 teeth, out of a total of 986 randomly selected teeth that had been root filled in the Prince Philip Dental Hospital (PPDH), Hong Kong, between 1981 and 1989. The criteria for failure were extractions (except for documented nonendodontic reason), retreatments and presence of a periapical radiolucency. The survival function of the treated teeth was plotted against the calculated date of failure using the Kaplan-Meier (K-M) method. Covariables were examined further by Cox

Regression analysis with a backward stepwise method. RESULTS: A total of 314 teeth (52%) were either documented or deemed to have failed after examination. The median survival time was 111 months. Cox Regression analysis indicated that the survival of root-filled teeth was significantly influenced by the tooth type, preoperative periapical status and the type of coronal restoration. The survival function declined with time, with a rapid drop in the first 18 months or so. The rate at which failures occurred appeared to slow down with a longer observation time. CONCLUSIONS: There was a nonlinear decline in the cumulative survival probability of primary root canal treatment. Tooth type, preoperative periapical status and type of post and final restoration significantly affected the long-term survival of the treated teeth.



Cheung LK, Wong MCM, Wong LL. (2002) Refinement of facial reconstructive surgery by stereo-model planning. *Annals of the Royal Australasian College of Dental Surgeons* **16**, 129-132.

Abstract:

The development of rapid prototyping has evolved from crude milled models to laser polymerized stereolithographic models of excellent accuracy. The technology was advanced further with the recent introduction of fused deposition modelling and a three-dimensional ink-jet printing technique in stereo-model fabrication. The concept of using a three-dimensional model in planning the operation has amazed maxillofacial surgeons since its first application in grafting a skull defect in 1995. It was followed by many bright ideas for applications in the

field of facial reconstructive surgery. Stereo-models may assist in diagnosis of facial fractures, joint ankylosis and even impacted teeth. The surgery can be simulated prior the operation of complex craniofacial syndromes, facial asymmetry and distraction osteogenesis. The stereo-model can be used for preparation of reconstructive plate or joint prostheses. It is of enormous value for educational teaching and as a patient information tool when obtaining the consent for surgery.



Cheung LK, Lo J. (2002) The long-term clinical morbidity of mandibular step osteotomy. *The International Journal of Adult Orthodontics and Orthognathic Surgery* **17**, 283-290.

Abstract:

The objectives of this retrospective study were to assess the clinical applications of mandibular step osteotomy (MSO) and to evaluate its long-term clinical morbidities. A total of 152 patients with MSO performed between 1990 and 1999 were assessed. Forty-two patients were successfully recalled

through questionnaires and clinical parameters for clinical evaluation, which included (1) tooth sensibility; (2) periodontal status; (3) neurosensory deficit in terms of light-touch threshold, 2-point discrimination, and pain threshold; and (4) temporomandibular joint function. The patients were finally asked about

their overall satisfaction with the surgical treatment. The result revealed that MSO was commonly indicated for the correction of mandibular hyperplasia. Clinical assessments showed that 2.75% of the teeth assessed had negative pulpal response, 3.9% showed mildly increased probing depth, and another 3.9% showed gingival recession. Neurosensory assessment revealed that 31% of the operating sites had an increased light-touch threshold, 4.8% had heightened

2-point discrimination, and 9% had an elevated pain threshold. Also, 9.7% of the patients showed reduced mouth opening and 17% had mild tenderness of masticatory muscles. Of all the patients assessed, 12% were not satisfied with the orthognathic treatment. The reasons included relapse, residual asymmetry, and persistent paresthesia.



Cheung LK, Zhang Q, Wong MCM, Wong LL. (2003) Stability consideration for internal maxillary distractors. *Journal of Cranio-maxillo-facial Surgery* **31**, 142-148.

Abstract:

PURPOSE: Stability in distractor design ensures distraction osteogenesis healing with good bone regenerate formation. The aim of this study was to compare the holding strengths of different fixation systems for maxillary distractor design on bone pieces of different thicknesses. **MATERIAL AND METHODS:** Cross-sectional images of 10 dry skulls were obtained by computer tomography and the bone thickness of the maxillae were measured according to five individual anatomical regions (paranasal, infra-orbital, posterior sinus wall, zygomatic and alveolar regions). According to the measurements, the screws of 1.5 and 2mm in diameter and the three-screw mini-plates in triangular and straight configurations were evaluated for holding strength by pull-

out tests on fresh animal bone pieces of defined thickness. **RESULTS:** The paranasal and zygomatic regions of the human skulls had the thickest cortical bone (4mm) followed by the alveolar region (2mm). In the bones of 2 and 4mm thickness, the 2mm screws were confirmed stronger than the 1.5mm ones in pull-out tests. However, the pull-out behaviour of screws of different diameters in 1mm thick bones and the mini-plates in two different configurations showed no significant differences. **CONCLUSION:** This study confirms that the paranasal and zygomatic bones are the thickest for fixation of internal maxillary distractors. Fixation screws of 2mm diameter in either triangular or straight miniplates can produce good stabilization for distractors.



Chow TW, Chung RW, Chu FCS, Newsome PR. (2002) Tooth preparations designed for posterior resin-bonded fixed partial dentures: a clinical report. *The Journal of Prosthetic Dentistry* **88**, 561-564.

Abstract:

Numerous designs for posterior resin-bonded fixed partial dentures have been reported in the dental literature, but a methodical technique is still lacking. A groove, plate, and strut approach involving mini-

mal preparation of posterior abutments to receive a resin-bonded fixed partial dentures is presented. The essential clinical and laboratory procedures are illustrated.

Chu CH, Chow TW. (2003) Esthetic designs of removable partial dentures. *General Dentistry* **51**, 322-324.

Abstract:

The increased emphasis on physical appearance in contemporary society has increased the demand for esthetic dental restorations. Although the success of implant dentistry has expanded the scope of esthetic fixed prostheses, many patients demand a removable partial denture (RPD) for health, anatomic, psychological, or financial reasons. Fabricating an es-

thetically pleasing RPD while avoiding the unsightly display associated with conventional clasp assemblies often presents a challenge to dentists. This article examines using lingual clasps, proximal undercuts (also known as rotational path insertion), and acetal resin clasps as simple and effective means of improving RPD esthetics.



Chu FCS, Siu ASC, Newsome PR, Chow TW, Smales RJ. (2002) Restorative management of the worn dentition: 4. Generalized toothwear. *Dental Update* **29**, 318-324.

Abstract:

This is the final paper of a four part series on the management of worn dentition. The factors affecting the selection of restorative techniques for generalized toothwear, such as pulpal vitality, jaw relation-

ship and occlusal guidance are discussed. The practical steps of oral rehabilitation using fixed prostheses are illustrated with two clinical cases.



Chu FCS, Sham ASK, Yip HK. (2002) Fractured dens evaginatus and unusual periapical radiolucency. *Dental Traumatology*. **18**, 339-341.

Abstract:

Dens evaginatus (DE) is not uncommon. It can affect the premolars of people of oriental ethnicity, and it can lead to different clinical problems. This article describes the diagnosis and management of a

patient presenting with a fractured tubercle of DE and an unusual buccal abscess in relation to periapical radiolucency extending around the mandibular second premolar and first molar.



Chu FCS, Li TKL, Lui VK, Newsome PR, Chow RL, Cheung LK. (2003) Prevalence of impacted teeth and associated pathologies—a radiographic study of the Hong Kong Chinese population. *Hong Kong Medical Journal* **9**, 158-163.

Abstract:

OBJECTIVES: To investigate the prevalence and pattern of impacted teeth and associated pathologies in the Hong Kong Chinese population. **SETTING:** The Reception and Primary Care Clinic, Prince Philip Dental Hospital, Hong Kong. **DESIGN:** Retrospective study. **SUBJECTS AND METHODS:** The records of 7486 patients were examined to determine whether the chief complaints were related to impacted teeth and associated pathologies, which were investigated using pan-

oramic radiographs. **RESULTS:** A total of 2115 (28.3%) patients presented with at least one impacted tooth. Among the 3853 impacted teeth, mandibular third molars were the most common (82.5%), followed by maxillary third molars (15.6%), and maxillary canines (0.8%). Approximately 8% of mandibular second molars associated with impacted third molars had periodontal bone loss of more than 5 mm on their distal surfaces. Caries were also found on the same surfaces in approximately 7% of the sec-

ond molars. Approximately 30% of patients with dental impaction had symptoms, and 75% had complaints limited to one side of the mouth. CONCLUSIONS: The prevalence of impacted teeth was high, and there was a predilection for impacted third molars in the mandible. More than 50% of max-

illary third molars had erupted, creating potential trauma of the pericoronal tissues of the partially erupted mandibular third molars. Caries and periodontal diseases were commonly seen in relation to the impacted third molars, whereas cystic pathology and root resorption were rarely observed.



Chung RW, Siu ASC, Chu FCS, Chow TW. (2003) Magnet-retained auricular prosthesis with an implant-supported composite bar: a clinical report. *Journal of Prosthetic Dentistry* **89**, 446-449.

Abstract:

The use of craniofacial implants to assist in retaining auricular prostheses often requires complex laboratory procedures, involving production of an accurate casting, fitting of a precious alloy bar, and the

use of clips. A simplified method for the retention of an auricular prosthesis with a composite bar and magnets is described in this article.



Clark RKF, Cheng YY, Chow TW. (2003) Events in the mould during heat processing of poly(methyl methacrylate). *European Journal of Prosthodontics and Restorative Dentistry* **11**, 29-31.

Abstract:

Recordings of temperature and pressure in the mould have raised questions concerning the flow of poly(methylmethacrylate) during heat processing. Three simple experiments investigated flow of polymerised and partly polymerised poly(methylmethacrylate). Flow was not observed at normal processing temperatures. These results, combined with the results of previous work, suggest that as the mould

heats up, thermal expansion of the dough exceeds polymerisation contraction, causing increase in pressure rather than flow. Maximum pressure occurs at maximum temperature. Thereafter, thermal expansion is reduced, polymerisation contraction increases and pressure in the mould drops. When the lowest pressure is reached the poly(methylmethacrylate) is polymerised.



Comfort MB, Tse AS, Tsang AC, McGrath C. (2002) A study of the comparative efficacy of three common analgesics in the control of pain after third molar surgery under local anaesthesia. *Australian Dental Journal* **47**, 327-330.

Abstract:

BACKGROUND: The aim of this study was to evaluate the comparative efficacy of three commonly used analgesics (Panadeine, Diflunisal and Etodolac) in the control of pain after third molar surgery under local anaesthesia. METHODS: A randomized control study. Outcome of primary efficacy was judged by overall assessment of the area under the curve of graphs for pain intensity, measured from serial visual analogue scales over a 24-hour period. Other

measures of efficacy included the number (per cent) of patients who took 'additional' analgesics and the incidence of adverse effects occurring in each treatment group over the study period. RESULTS: The three drugs were effective in the control of post-operative pain ($p < 0.01$). Variations in pain intensity and the use of additional medication between the treatment groups were observed over the study period. The Diflunisal group experienced less pain

than the Panadeine or Etodolac group ($p < 0.01$). Furthermore, a lesser number of those in the Diflunisal group used additional medication compared to the other two groups ($p < 0.01$). The incidence of side effects from all three drugs was low. CONCLUSION:

Diflunisal is superior in the control of pain following third molar surgery under local anaesthesia than either Panadeine or Etodolac, and has few side effects.



Corbet EF, Zee KY, Lo ECM. (2002) Periodontal diseases in Asia and Oceania. *Periodontology 2000* **29**, 122-152.



Dassanayake RS, Samaranyake LP. (2003) Amplification-based nucleic acid scanning techniques to assess genetic polymorphism in *Candida*. *Critical Reviews in Microbiology* **29**, 1-24.

Abstract:

Opportunistic pathogen *Candida* causes common fungal infections that manifest both superficially and systemically, especially in compromised patients. Although *C. albicans* is by far the main etiological agent of candidosis, the frequency of isolation of other non-*albicans* species such as *C. glabrata* and *C. krusei* is increasing at an alarming rate. Therefore, the epidemiology, pathogenicity, and diagnosis of infections due to these organisms are of great importance. Of a variety of genotyping methods utilized for strain delineation of these *Candida* species, amplification-based techniques such as randomly amplified polymorphic DNA (RAPD), amplified fragment length polymorphism (AFLP), restriction digestion-mediated PCR (RFLP-PCR), and single-stranded conformational polymorphism (SSCP) and microsatellite PCR (interrepeat PCR, IR-PCR) are the most popular and widely used. In the last decade

or so these techniques have helped unravel the clinical epidemiological features of pathogenicity, diversity, microevolution, and natural heterozygosity in *Candida* species. Here we review in detail the basic principles of RAPD, the nature of the primer and factors influencing its selection, and the limitations of RAPD assays as well as analysis and interpretation of banding profiles generated using the software programs. In addition, the principles of other RAPD-based amplification techniques (AFLP, RFLP-PCR, SSCP, and IR-PCR) and their application in molecular epidemiologic studies of *Candida* species in particular and other fungi in general are also reviewed. It is concluded that these methods have wide applicability in genotyping fungi, although they differ greatly in their resolution and have advantages and drawbacks depending on the task in question.



Gao W, Peng D, Smales RJ, Yip HK. (2003) Comparison of atraumatic restorative treatment and conventional restorative procedures in a hospital clinic: evaluation after 30 months. *Quintessence International* **34**, 31-37.

Abstract:

OBJECTIVE: The purpose of this study was to evaluate two glass-ionomer cements placed in the occlusal surfaces of permanent molar teeth, using two cavity preparation methods. **METHOD AND MATERIALS:** Three dentists placed 149 restorations for 68 patients in a hospital clinic. Atraumatic restorative treatment or conventional cavity preparation methods were used for two encapsulated, high-

strength conventional glass-ionomer cements: Fuji IX GP and Ketac-Molar. Non-gamma 2 amalgam alloy was used in conventional preparations for comparison. **RESULTS:** The restorative procedures were uneventful, but cavity preparations made with atraumatic restorative treatment hand instruments took approximately twice as long as did conventional rotary instrumentation. After 30 months, only

one glass-ionomer cement restoration had failed. Both glass-ionomer cements showed high early losses of sealant material, but caries was not detected in the exposed fissures. Both glass-ionomer cements also showed relatively high restoration wear. At 30 months, the mean cumulative net occlusal wear was 119 +/- 12 mm for Fuji IX GP and 96 +/- 13 mm for Ketac-Molar; the difference was not statistically significant. Color matching improved significantly by 6

months; there was no significant difference in color match between the two glass-ionomer cements by 12 months. Minor surface tarnishing and marginal discrepancies were present in the amalgam restorations and increased with time. CONCLUSION: The occlusal restorations performed satisfactorily over periods of up to 30 months. However, the continued deterioration of the cements requires longer-term studies to be undertaken.



Hashimoto M, Tay FR, Ohno H, Sano H, Kaga M, Yiu C, Kumagai H, Kudou Y, Kubota M, Oguchi H. (2003) SEM and TEM analysis of water degradation of human dentinal collagen. *Journal of Biomedical Materials Research* **66B**, 287-298.

Abstract:

Recently several long-term studies have reported evidence of the hydrolytic degradation of collagen fibrils based on fractured surface observations after bond testing. Those studies suggested that one cause of the decline in the bond strength was the degradation of the collagen fibrils within the bonds. However, one concern has been raised that the dentinal collagen fibrils may be stable in water that does not contain oral bacteria or enzymes. Therefore, the present study aimed to clarify the micromorphological change in naked collagen fibrils after 500 days of water storage. To prepare exposed collagen fibrils, sectioned and polished human dentin surfaces were

acid conditioned for 15 s with the use of two commercially available acid conditioners: All-Etch (10% phosphoric acid) and Uni-Etch (32% phosphoric acid) (Bisco, Inc.). Those specimens were stored in distilled water at 37 degrees C for 1 day (control) for 500 days. After the storage periods, the samples were examined with the use of SEM and TEM. Under SEM and TEM examination, micromorphological alterations (disarrangement of collagen web, widening the interfibrillar space, and the thinning diameter of collagen fibrils) were found in the specimens after 500 days in water.



Hägg U, Du X, Rabie ABM. (2002) Initial and late treatment effects of headgear-Herbst appliance with mandibular step-by-step advancement. *American Journal of Orthodontics and Dentofacial Orthopedics* **122**, 477-485.

Abstract:

The aim of this study was to investigate the effects of the headgear-Herbst appliance with mandibular step-by-step advancement followed by retention with the headgear activator. The sample comprised 22 consecutively treated patients (13.2 +/- 1.5 years old) and 31 matched controls (12.6 +/- 1.3 years old). Lateral cephalograms were obtained at the beginning of treatment, after 6 months (at completion of the initial phase), after 12 months of active treatment (at the end of the late phase), and after 18 months (at the end of retention). The results showed that the skeletal effects over 12 months of treatment were restrained maxillary growth, enhanced mandibular growth, and reduced increase in lower facial height. The restraint effect on the maxilla was significant in

both the initial and late phases; the enhanced growth of the mandible was significant during the initial phase only; and the height of the lower face was affected during the late phase only. During retention with the headgear activator, the jaw base relationship was maintained, and the effect on the lower facial height was reinforced. A small relapse of the overjet and molar relationship was the result of dental changes only. During 18 months of active treatment and retention, the overjet correction was the result of 70% skeletal changes. The headgear-Herbst appliance is an effective orthopedic device, and the effect on the maxilla seems to increase with the length of treatment, but the pattern was reversed for the mandible.

Hägg U, Du X, Rabie ABM, Bendeus M. (2003) What does headgear add to Herbst treatment and to retention? *Seminars in Orthodontics* 9, 57-66.

Abstract:

This study was designed to investigate the effect of adding headgear to the Herbst appliance and the retainer respectively. The material comprised of two samples of consecutively treated patients with skeletal Class II malocclusion. The first sample of 22 patients (Mean age 13.2 years) was treated with High-pull Headgear Herbst appliance followed by Headgear Activator as retainer, and the second sample of 14 patients (Mean age 12.9 years) was treated with Herbst appliance and a conventional activator for retention. In both groups the Herbst appliance was a casted sliver splint type with step-by-step advancement of the mandible, and prior to treatment there was no significant difference in dento-facial morphology between the groups. Changes during treatment and retention were assessed from lateral cephalograms obtained at start of treatment, after six-months treatment, end of treatment (12 months of treatment) and after six-months of retention. The results showed that the maxillary forward growth was more restraint after 6 months and increasingly

more during the 12 months of treatment in the Headgear Herbst group, resulting in larger improvement of the jaw-base relationship in that group. The maxilla tilted in the Herbst group, but not in the Headgear-Herbst group. During retention the positive skeletal changes achieved during active treatment were maintained with the Headgear Activator, whereas the conventional activator partly ruined the results of the active treatment. The overjet correction was similar in both groups, being 9.0 and 9.7 mm respectively. With the combined Headgear concept 70 per cent of the overjet correction was due to skeletal changes, whereas in the other group the skeletal contribution was less than 30 per cent. In conclusion adding headgear to the Herbst resulted in increased orthopaedic effect on the maxilla and larger improvement of the jaw-base relationship. The choice of retention device was critical, the Headgear activator maintained the treatment results, whereas the conventional activator had a negative effect and should not be used as retainer after Herbst treatment.



Hägg U, Tse EL, Rabie ABM, Robinson W. (2003) A comparison of splinted and banded Herbst appliances: treatment changes and complications. *Australian Journal of Orthodontics* 18, 76-81.

Abstract:

The aims of this study were to compare the frequency of clinical problems, such as fracture and dislodgment, and the dentofacial changes in 28 13-year-old Chinese children with Class II, division 1 malocclusions treated with either cast-metal splinted Herbst appliances or banded Herbst appliances. The first fourteen children were treated with a maximum anchorage type of banded Herbst appliance for six months, and the remainder were treated with cast-silver splinted Herbst appliances for seven months. The dentofacial form and the treatment changes were assessed with one aid of pre- and post-treatment lateral cephalometric radiographs. The number of visits and the number of fractured and dislodged ap-

pliances were recorded. Both appliances had similar effects on the dentofacial structures. There were no statistically significant dentofacial differences between the groups at the conclusion of treatment. During treatment relatively few banded appliances were dislodged and few splinted appliances fractured. However, a large number of banded appliances fractured, and a similar number of splinted Herbst appliances were dislodged. The latter required less clinical and laboratory time to service and/or replace. It was concluded that splinted Herbst appliances are preferable to banded Herbst appliances because of the savings in clinical and laboratory time.

Hu JY, Li YQ, Smales RJ, Yip HK. (2002) Restoration of teeth with moreviscous glass ionomer cements following radiation-induced caries. *International Dental Journal* **52**, 445-448.

Abstract:

Objective: To assess the suitability of more-viscous conventional restorative glass ionomer cements (GICs) in a high-carries risk group of patients. Methods: Fifteen adult patients with radiation-induced caries were treated at a dental hospital by one dentist. Two encapsulated aesthetic GICs were used in each patient to restore 146 carious lesions in the exposed dentine and cementum of 93 teeth. The restorations were assessed directly over two years for their retention, secondary caries, anatomic form, marginal integrity, marginal discolouration, and surface texture. Results: Both GICs were placed in similar sized cavi-

ties (P = 0.63). After two years, although 30.0% of Ketac-Molar Aplicap and 12.5% of Fuji IX GP restorations had been lost (P = 0.01), there were no instances of secondary caries. The remaining GICs showed ongoing marginal deterioration, but there were very few instances where this required the repair or replacement of the restorations. No restorations failed from surface erosion. Conclusions: In these high-carries risk patients the placement of more-viscous GICs appeared to prevent secondary caries, even when the restorations were subsequently lost.



Huang Q, Opstelten D, Samman N, Tideman H. (2003) Experimentally induced unilateral tooth loss: expression of type II collagen in temporomandibular joint cartilage. *Journal of Oral and Maxillofacial Surgery* **61**, 1054-1060.

Abstract:

PURPOSE: We sought to examine possible changes in pattern and concentration of type II collagen in the condylar cartilage and articular disc of the temporomandibular joint (TMJ) in response to unilateral extraction of mandibular teeth in a rabbit model as a means of elucidating the effects of unilateral mastication on the TMJ. METHODS: A total of 12 experimental rabbits were killed either 3 or 6 weeks after the extractions, and 3 additional rabbits without extractions were used as controls. TMJ blocks from both sides of each of the 15 animals were examined for type II collagen via an immunoperoxidase procedure. RESULTS: Anti-type II collagen antibody (Ab) binding was detected mainly in the hypertrophic chondroblast layer of the condylar cartilage of normal rabbits. At 3 weeks after unilateral extraction of

teeth, anti-type II collagen Ab binding to the territorial matrix of the hypertrophic chondroblast layer of the condylar cartilage and to the disc was stronger than normal. The increase in Ab binding appeared more dramatic on the nonfunctional side than on the functional side of TMJ. Variations from the normal pattern of anti-type II collagen Ab binding in terms of distribution through the extracellular matrix and fibrillar appearance were also observed. CONCLUSION: The findings suggest that the condylar cartilage and disc adapt to the imbalance induced by unilateral extraction of teeth through chondrocyte repair responses involving collagen II expression that appear to differ between the functional and non-functional sides of the TMJ.



Jin Y, Yip HK. (2002) Supragingival calculus: formation and control. *Critical Reviews in Oral Biology and Medicine* **13**, 426-441.

Abstract:

Dental calculus is composed of inorganic components and organic matrix. Brushite, dicalcium phosphate dihydrate, octacalcium phosphate, hydroxyapatite, and whitlockite form the mineral part of dental calculus. Salivary proteins selectively adsorb on the tooth surface to form an acquired pellicle. It is

followed by the adherence of various oral micro-organisms. Fimbriae, flagella, and some other surface proteins are essential for microbial adherence. Microbial co-aggregation and co-adhesion enable some micro-organisms, which are incapable of adhering, to adhere to the pellicle-coated tooth surface. Once or-

ganisms attach to the tooth surface, new genes could be expressed so that mature dental plaque can form and biofilm bacteria assume increased resistance to antimicrobial agents. Supersaturation of saliva and plaque fluid with respect to calcium phosphates is the driving force for plaque mineralization. Both salivary flow rate and plaque pH appear to influence the saturation degree of calcium phosphates. Acidic phospholipids and specific proteolipids present in cell membranes play a key role in microbial

mineralization. The roles of crystal growth inhibitors, promoters, and organic acids in calculus formation are discussed. Application of biofilm culture systems in plaque mineralization is concisely reviewed. Anti-calculus agents used—centering on triclosan plus polyvinyl methyl ether/maleic acid copolymer, pyrophosphate plus polyvinyl methyl ether/maleic acid copolymer, and zinc ion-in-commercial dentifrices are also discussed in this paper.



Jin Y, Yip HK, Samaranayake YH, Yau JYY, Samaranayake LP. (2003) Biofilm-forming ability of *Candida albicans* is unlikely to contribute to high levels of oral yeast carriage in cases of human immunodeficiency virus infection. *Journal of Clinical Microbiology* **41**, 2961-2967.

Abstract:

An increased prevalence of candidal carriage and oral candidiasis is common in cases of human immunodeficiency virus (HIV) infection, and the reasons for this may include the enhanced ability of colonizing yeasts to produce biofilms on mucosal surfaces. The aim of the present study was therefore to examine the differences, if any, in the biofilm-forming abilities of 26 *Candida albicans* yeast isolates from HIV-infected individuals and 20 isolates from HIV-free individuals, as this attribute of yeast isolates from patients with HIV disease has not been examined before. Biofilm formation in microtiter plate wells was quantitatively determined by both the 2,3-bis(2-methoxy-4-nitro-5-sulphophenyl)-5-[(phenylamino) carbonyl]-2H-tetrazolium hydroxide (XTT) reduction method and the crystal violet method. Although candidal biofilm formation could be quantitatively evaluated by either technique, the

better reproducibility ($P < 0.05$) of the XTT reduction assay compared with that of the crystal violet method led us to conclude that the former is more reliable. There were no significant quantitative differences in biofilm formation between *C. albicans* isolates from HIV-infected patients and isolates from HIV-free individuals during in vitro incubation in a multiwell culture system over a period of 66 h. Three of eight host factors in the HIV-infected group were found to be associated with candidal biofilm formation. Thus, yeasts isolated from older individuals and those with higher CD4-cell counts exhibited decreased biofilm formation, while the findings for yeasts from individuals receiving zidovudine showed the reverse ($P < 0.05$ for all comparison). Our data indicate that attributes other than biofilm formation may contribute to the increased oral yeast carriage rates in cases of HIV infection.



King NM, Sanares AM. (2002) Oral-facial-digital syndrome, Type I: a case report. *The Journal of Clinical Pediatric Dentistry* **26**, 211-215.

Abstract:

Oral-facial-digital syndrome is a group of congenital anomalies, which affects the face, oral structures and digits. There are nine subtypes. OFDS type I, is x-linked dominant trait mostly affecting females. Reports of OFDS type 1 in Asians are extremely rare.

This paper shows a case of OFDS type 1, in a southern Chinese girl, who in addition to most of the classic features, had fusion of the mandibular canine and lateral incisor teeth.

Law KT, King NM. (2003) Clinical considerations in the provision of restorative dental treatment for children under general anaesthesia: a review. *European Journal of Paediatric Dentistry* 4, 59-67.

Abstract:

AIM: Dental treatment under general anaesthesia is one of the options for young or uncooperative children, and disabled patients. However, special considerations are necessary before proceeding with this form of anaesthesia. This article reviews the indica-

tions, complications and safety factors, the anatomic and physiological considerations, drug interactions, current treatment outcomes and the reasons for repeated anaesthesia for the provision of dental treatment under general anaesthesia for children.

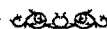


Lee W, O'Donnell D. (2003) Severe gingival hyperplasia in a child with I-cell disease. *International Journal of Paediatric Dentistry* 13, 41-45.

Abstract:

I-cell disease (mucopolipidosis II) is a rare metabolic disorder resulting from the deficiency of a specific lysosomal enzyme, N-acetylglucosamine-1-phosphotransferase. The disease presents as a mental and motor developmental delay with oral manifestations that include severe gingival hyperplasia usually seen before one year of age. The life expectancy of children with this condition is poor, with death usually occurring around the fifth year. A case

report of a 3-year-old Pakistani male, with I-cell disease, is presented. The chief dental concerns of the parents were his swollen gums and delayed tooth eruption. Supportive treatment only was initiated. Differential diagnosis for severe gingival overgrowth in young patients should take account of this rare metabolic disorder in addition to hereditary and idiopathic fibromatosis and drug associated gingival overgrowth.



Leung AC, Cheung LK. (2003) Dental implants in reconstructed jaws: patients' evaluation of functional and quality-of-life outcomes. *The International Journal of Oral and Maxillofacial Implants* 18, 127-134.

Abstract:

PURPOSE: To evaluate the quality-of-life aspect of treatment outcome following functional jaw reconstruction and dental implants in the maxilla or mandible. MATERIALS AND METHODS: This cross-sectional study used a questionnaire interview of 28 rehabilitated patients who received autogenous bone grafts from the ilium and endosseous implants (14 maxillary and 14 mandibular cases; 134 implants) for functional jaw reconstruction between 1988 and 1999. A questionnaire was developed to assess the quality-of-life outcome for those patients who had finished their rehabilitation at least 6 months prior to the interview. Responses to the questions were recorded by means of visual analog scales. RESULTS:

In general, patients gave positive comments on the restoration of their orofacial appearance and function (mastication and speech). The majority (85.7%) found no problem in various daily social activities, including dining in public. DISCUSSION: The overall level of satisfaction with the treatment outcome and the degree of recommendation of the treatment to others were both favorable (mean scores 8.6 and 8.7 out of 10, respectively). CONCLUSION: Oral rehabilitation using functional jaw reconstruction can reach a satisfactory level of esthetics, function, and psychosocial well being of patients, thus improving their quality of life.

Leung WK, Yau JYY, Cheung BPK, Jin LJ, Zee KY, Lo ECM, Samaranyake LP, Corbet EF. (2003) Oral colonisation by aerobic and facultatively anaerobic Gram-negative rods and yeast in Tibetans living in Lhasa. *Archives of Oral Biology* **48**, 117-123.

Abstract:

Sample groups of children (n=50) and adults (n=38) were selected from pools of 207 children, (11-13-year olds from two primary schools) and 94 adults (25-44-year olds from four governmental agencies) who were the subjects of an oral health survey among Tibetans living in Lhasa, Tibet Autonomous Region. Mean ages of the study groups of children (38% females) and adults (61% females) were 11.6 +/- 0.9 and 37.1 +/- 6.1 years, respectively. All had lived in Tibet since birth. Oral rinse samples were selective cultured to isolate, quantify and speciate aerobic and facultatively anaerobic Gram-negative rods (using the API 20E kit) and yeasts (using API 20C AUX and API ZYM kits). For children, the isolation rates for oral coliform bacteria and yeasts were 84 and 14%, respectively, for adults, the respective rates were 26 and 40%. The corresponding quantities of coliforms /yeasts for children and adults were 0.4 +/- 1.6 x 10³ c.f.u. / 15.8 +/- 72.3 and 0.2 +/- 0.6 x 10³ c.f.u. / 57.2 +/- 137.5 c.f.u. per millilitre oral rinse,

respectively. Aerobic and facultatively anaerobic Gram-negative rods and *Stenotrophomonas maltophilia*, a free-living saprophytic and ubiquitous bacteria[species of wide geographic distribution, were significantly more frequently recovered from the children's oral rinses. The isolation rates of facultatively anaerobic Gram-negative rods in adults and yeasts in both groups were similar to those found in similar cohorts from southern China in earlier studies. Randomly amplified polymeric DNA analysis showed that the *S. maltophilia* spp. isolated from children were of several different clonal types and were school specific. This study shows that the colonisation rate of facultatively anaerobic Gram-negative rods in adults and yeasts in both groups are similar to those in populations living at lower altitudes, the native young, urban Tibetans appear to exhibit a high oral carriage rate of *S. maltophilia* spp. (C) 2003 Elsevier Science Ltd. All rights reserved.



Leung WK, Yau JYY, Jin LJ, Chan AWK, Chu FCS, Tsang PCS, Chan TM. (2003) Subgingival microbiota of renal transplant recipients. *Oral Microbiology and Immunology* **18**, 37-44.

Abstract:

Renal transplant patients undergoing immunosuppressive therapy may experience periodontal side-effects such as gingival overgrowth. This study evaluated the subgingival microbiota of renal transplant recipients with or without periodontal tissue destruction who may have concurrent gingival enlargement. Subgingival paper point samples taken from the deepest probing sites of 38 subjects (one per patient) were examined using direct microscopy and culture techniques. A complex microflora comprising gram-positive and gram-negative cocci, rods and filaments, fusiforms, curved rods and spirochetes was observed using microscopy. Yeasts were occasionally detected. Significantly higher proportions of gram-positive morphotypes, including gram-positive cocci, were observed in samples from

periodontally healthy patients. The predominant cultivable microflora from anaerobic culture comprised several species of facultative and obligate anaerobes. Colonization of the subgingival sites by 'foreign' microbes that are normally dermal, intestinal or vaginal flora was detected in up to 50% of the samples. High mean proportions of lost or unidentified species were also occasionally noted. The results showed that the subgingival biofilm of renal transplant recipients with chronic periodontitis comprised mainly gram-negative rods and spirochetes. Besides the usual predominant cultivable subgingival microbiota associated with periodontitis, the high prevalence of unidentified and 'foreign' microbes indicates the possibility of subgingival microbial alteration in renal transplant patients.

Li TKL, Wong J, Ma ECY, Islam MS, Zhao YP. (2003) Comparison of two digital imaging plate systems. *Journal of Modern Stomatology* 17, 35-37.

Abstract:

Objective: To compare the performance of the Digora (Soredex, Finland) and the DenOptix (Densply, USA) digital storage phosphor imaging plane systems particularly in their abilities to detect standardized artificially created cavities on the occlusal surface of teeth. Methods: A DXTTR II phantom, which had human teeth and jaw, was used. A range of exposures were used in the study. Lesions were created using 1/2, 1, 2 size stainless steel round burs on the occlusal aspect of premolars and molars. Bitewing and periapical radiographs were taken for each size defect using Digora and DenOptix imaging plates. A total of 96 images were collected. These images were shown to five observers in standard viewing conditions. Images were placed in a random manner irrespective of there exposure and cavity size. Ob-

servers were asked to give their opinion about the presence of cavities. To see the inter- and intraobservers variability a second session of observation was arranged at one week interval. Results: The Digora imaging plates system had narrower exposure latitude than the DenOptix imaging plates system. Diagnostically acceptable image could be obtained by using the two digital systems at a lower exposure. The digora software was more user - friendly than the DenOptix software. No statistically significant difference was found in these two imaging systems in their ability to detect occlusal artificial cavity. Conclusion: The DenOptix phosphor storage imaging plate system was comparable to Digora phosphor storage imaging plate system for diagnostic purpose.



Low D. (2002) Mouthguard protection and sports-related dental trauma. *Annals of the Royal Australasian College of Dental Surgeons* 16, 153-155.

Abstract:

Sports dentistry is a new discipline that involves the prevention and treatment of sports-related dental diseases and trauma. As dental professionals, we have responsibility to educate ourselves, and the public community on issues related to sports dentistry, and specifically to the prevention of sports-related dental traumatic injuries. It is incumbent upon us to take the lead in conducting this type of educa-

tional and research activities. It is crucial for dental professionals to educate and promote all phases of sports dentistry to the public. Dental professionals should emphasize the continued susceptibility of individual to sports-related dental trauma and the importance of implementing appropriate preventive measures; and seeking early intervention of individual who requires preventive treatments.



Low D. (2003) New die design for dimensional accuracy assessment of crown castings. *International Journal of Prosthodontics* 16, 13-18.

Abstract:

PURPOSE: The aim of this study was to introduce a newly designed die for ceramometal restoration, and to compare the dimensional accuracy with the traditional complete-crown design. Two methods of dimensional accuracy assessment, vertical axial discrepancy and transverse diametral percentage, were compared. MATERIALS AND METHODS: Patterns were prepared from two different die designs—complete crown and ceramometal. Two investments available for titanium crown casting were used, Titavest CB and T-invest C & B. Titanium castings

were made from each investment with a high-pressure casting machine. Vertical axial discrepancy of casting was determined by measuring the discrepancy for each set of wax patterns and their castings on the same die under a traveling microscope. Dimensional accuracy was expressed as vertical axial discrepancy and by transforming the vertical axial discrepancy into transverse diametral percentage. RESULTS: Both dies produced undersized castings with T-invest C & B and oversized castings with Titavest CB. Dimensional accuracy assessment of

the two different types of crown casting design showed no significant difference in vertical axial discrepancy. **CONCLUSION:** Compared to the traditional transverse diametral percentage calculation, the

vertical axial discrepancy assessment is independent of the die's dimensions. The two types of investment materials studied resulted in castings with different dimensional accuracies.



Lu M, Rabie ABM. (2002) The effect of demineralized intramembranous bone matrix and basic fibroblast growth factor on the healing of allogeneic intramembranous bone grafts in the rabbit. *Archives of Oral Biology* 47, 831-841.

Abstract:

The aim here was to explore a new graft material that excludes the need to harvest autogenous bone from patients. Forty-two critical-size (10 x 15 mm) defects were created in rabbit mandibles bilaterally. Five groups of six defects each were grafted with autogenous endochondral (EC) bone, autogenous intramembranous (IM) bone, fresh-frozen allogeneic IM bone only, fresh-frozen allogeneic IM bone and demineralized bone matrix powder prepared from intramembranous bone (DBM(IM)) only, and fresh-frozen allogeneic IM bone and basic fibroblast growth factor (bFGF) mixed with DBM(IM) powder. The remaining defects were used as controls. Three weeks after surgery, the defects were retrieved for histological analysis. The amount of new bone formation was quantified by image analysis. No bone formed

across the defect in the controls; 224% more new bone formed in defects grafted with composite allogeneic IM bone/DBM(IM) than in those grafted with allogeneic IM bone alone ($p < 0.001$); 550% more new bone was formed in defects grafted with composite allogeneic IM bone/DBM(IM)/bFGF than in those grafted with allogeneic IM bone alone ($p < 0.001$). The amount of new bone in the group receiving composite allogeneic IM bone/bFGF/DBM(IM) was more than that in autogenous EC bone group, and very close to that in autogenous IM group. The results show that a composite of fresh-frozen allogeneic IM bone and bFGF in DBM(IM) powder is a good graft material that warrants further clinical investigation.



Mak YF, Lai SCN, Cheung GSP, Chan AWK, Tay FR, Pashley DH. (2002) Micro-tensile bond testing of resin cements to dentin and an indirect resin composite. *Dental Materials* 18, 609-621.

Abstract:

OBJECTIVES: Micro-tensile bond strength (microTBS) evaluation and fractographic analysis were used to compare four resin cement systems (AC: All-Bond 2/Choice; RX: Single Bond/RelyX ARC; SB: Super-Bond C & B; and PF: Panavia F) in indirect composite/dentin adhesive joints. **METHODS:** Flat dentin surfaces were created on extracted human third molars. The resin cements were used according to the manufacturers' instructions for bonding silanized composite overlays to deep coronal dentin. 0.9x0.9 composite-dentin beams prepared from the luted specimens were stressed to failure in tension. Dentin sides of all fractured specimens were examined by scanning electron microscopy (SEM) to examine the failure modes. In group PF, morphologic features that could not be resolved at the SEM level were further validated by transmission electron microscopy (TEM) examination of the SEM specimens. **RESULTS:** Statistical analyses re-

vealed significant difference ($p < 0.05$) among microTBS and failure modes in the resin cement groups. The two groups (AC and RX) with highest microTBS failed predominantly along the composite overlay/cement interface. Cohesive failure in resin cement was primarily observed in group SB that exhibited intermediate microTBS values. In group PF with the lowest microTBS, failure occurred mostly along the dentin surface. Globular resin agglomerates seen by SEM on PF-treated dentin were distinguished from silica fillers by TEM. **SIGNIFICANCE:** The bond between the processed composite and the luting resin cement was the weak link in indirect composite restorations cemented with AC or RX. Super-Bond C&B exhibited intermediate tensile strength and Panavia F is less reliable when used in conjunction with a self-etching primer for bonding indirect restorations to dentin.

McGrath C, Comfort MB, Lo ECM, Luo Y. (2003) Changes in life quality following third molar surgery-the immediate postoperative period. *British Dental Journal* **194**, 265-268.

Abstract:

OBJECTIVES: This study describes patients' perceptions of changes in oral health related quality of life (OHQOL) in the early postoperative period following third molar surgery. **METHODS:** One hundred patients were enrolled in a prospective cohort study of the surgical removal of lower third molars under local anaesthetic. Two specific oral health related quality of life measures, OHIP-14 and OHQoLUK, were administered to the study group prior to surgery. Standardized surgical and analgesic protocols were followed. Patients kept a diary of changes in life quality each postoperative day (POD) for 7 days, completing both OHIP-14 and OHQoLUK daily. **RESULTS:** Both oral health related quality of life measures identified a significant

deterioration in quality of life on POD1 (P<0.01) and this remained evident on POD2 (P<0.01), POD3 (P<0.01), POD4 (P<0.01) and POD5 (P<0.05). By POD6 and POD7 there was no significant difference in quality of life compared with preoperative status (P>0.05). Deterioration in life quality over the study period was associated with postoperative clinical findings (P<0.05): swelling and trismus. **CONCLUSION:** The study concludes that there is a significant deterioration in oral health related quality of life in the immediate postoperative period following third molar surgery; particularly during the first five days. This is associated with postoperative clinical findings. This has implication for patients deciding on third molar surgery and informed consent.



McGrath C, Comfort MB, Lo ECM, Luo Y. (2003) Patient-centred outcome measures in oral surgery: validity and sensitivity. *The British Journal of Oral and Maxillofacial Surgery* **41**, 43-47.

Abstract:

The performances of patient-centred outcome measures after oral surgery were evaluated in a prospective cohort study of 100 patients who had third molar extractions. Participants self-completed a questionnaire incorporating a general health (12-item short form health survey: SF-12) and two specific outcome scales to oral health (oral health impact profile: OHIP-14, and The United Kingdom Oral Health related Quality of Life measure: OHQoL-UK) preoperatively, daily during the immediate postoperative period, and at the review appointment (7-days later). Ninety-seven completed the study. History of 'tak-

ing time off' work/study because of pericoronitis during the past year was significantly associated with preoperative OHIP-14 and OHQoL-UK scores. There were significant differences in SF-12, OHIP-14, OHQoL-UK scores during the immediate postoperative period compared with preoperatively, when postoperative symptoms were prevalent. At the review appointment, OHIP-14 and OHQoL-UK scores were associated with clinical findings. The measures were valid and sensate in relation to oral surgery. However, those specific to oral health were more discerning than the general scale.



McMillan AS, Wong MCM, Lo ECM, Allen PF. (2003) The impact of oral disease among the institutionalized and non-institutionalized elderly in Hong Kong. *Journal of Oral Rehabilitation* **30**, 46-54.

Abstract:

The study aimed to describe and compare the psychosocial and functional impact of oral disease on the quality of life of the institutionalized and non-institutionalized elderly in Hong Kong. A total of 268 institutionalized and 318 non-institutionalized elderly aged 60-80 years took part. The 49-statement Oral Health Impact Profile (OHIP) was ad-

ministered in a structured interview format and sociodemographic information collected prior to a clinical, oral examination. A greater number of the institutionalized were edentulous (19%); they also had more untreated dental disease. The number of elderly reporting negative impacts was generally low. The percentage of institutionalized elderly report-

ing a negative impact was significantly lower in one of the OHIP subscales (handicap, $P < 0.001$) and similar in the other six. The main factors affecting the OHIP score were living location, socio-economic status, dental disease and treatment seeking behaviour. In conclusion, the psychosocial and func-

tional impact of oral conditions was low and similar in the institutionalized and non-institutionalized elderly although the pattern of oral disease was different. Life events and socially and culturally derived values appeared to affect the elderly perception of the impact of oral disease.



Momoi Y, Akimoto N, Kida K, Yip HK, Kohno A. (2003) Sealing ability of dentin coating using adhesive resin systems. *American Journal of Dentistry* **16**, 105-111.

Abstract:

PURPOSE: To assess the sealing ability of dentin coating using adhesive resin systems to verify its potential in protecting the dentin/pulp from the oral environmental stimuli. **MATERIALS AND METHODS:** 15 extracted human premolars were prepared for complete crowns and the electrical resistance of their coronal dentin was measured. The prepared teeth were then randomly divided into three groups, and the prepared dentin surface of five teeth in each group was coated using one of three adhesive resin systems (All-Bond 2, Clearfil Liner Bond II, Super-Bond D-Liner) with low viscosity resins. Measurements for electrical resistance of the prepared coronal dentin was repeated after the first and second coat of the low viscosity resins, and at 1 and 4 weeks of storage in a physiological saline solution. Addition-

ally, three prepared teeth were exposed to either cold (37 degrees C \rightarrow 4 degrees C) or heat (37 degrees C \rightarrow 60 degrees C) stimulus and the temperature change was monitored inside the pulp chamber. Time-temperature curve was obtained before and after the first and the second dentin coating. **RESULTS:** Before dentin coating electrical resistance of the coronal dentin ranged from 1 to 11 k(omega), and increased significantly after the first coating by 3-15 times, and by 5-185 times after the second coating. Thermal diffusion was significantly smaller in the dentin after the coating. Before coating, the temperature change inside the pulp chamber ranged from 2-5 degrees C at 5 seconds after the thermal stimuli were applied. This decreased significantly to between 0.3-0.5 degrees C after the coating.



Newsome PR. (2003) Current issues in dental practice management. Part 2. Pricing policy in dental practice. *Primary Dental Care* **10**, 69-72.

Abstract:

This is the second in a series of articles exploring some of the issues facing dentists coming to terms with working in the 'brave new world'. It examines the complex issues of understanding how pricing

works, determining the price of a product or service, communicating this to customers, and understanding how people perceive prices and price changes.



Newsome PR. (2003) The role of the mouthguard in the prevention of sports-related dental injuries. *International SportMed Journal* **4**

Abstract:

This paper presents a review of oral-facial injuries received during participation in sport and the possibilities open to athletes for their prevention. It is clear that participation in a number of sports does carry a considerable risk of sustaining dental injury, not only in the so-called contact sports such as rugby and hockey, but also in less obviously dangerous sports such as basketball. The mouthguard is widely regarded as being the most effective way of preventing such injuries. It is also clear that the custom-

fabricated mouthguard, in particular the pressure-laminated variety, is seen to afford most protection. As with other preventive measures mouthguard usage is often less than the dental profession would like; the reasons for this are numerous, including a lack of awareness of the benefits of mouthguard wear. While much progress has been made in this area, the profession could do much more to promote the greater use of mouthguards.

Nikawa H, Jin C, Makihira S, Hamada T, Samaranyake LP. (2002) Susceptibility of *Candida albicans* isolates from the oral cavities of HIV-positive patients to histatin-5. *The Journal of Prosthetic Dentistry* **88**, 263-267.

Abstract:

Statement of problem. Oral surfaces, including the denture-fitting Surface, may serve as a reservoir for disseminated candidal infections, particularly in immunocompromised hosts Such as patients with AIDS. Histatins are a group of small, cationic antifungal peptides present in human saliva. There is limited information on the antifungal activity of peptides against *Candida albicans* isolates from HIV-positive patients. Purpose. This study investigated the fungicidal effects of histatin-5 against oral isolates of *C. albicans* from HIV-positive and HIV-negative patients. Material and methods. An isolate of *C. albicans* from each of 2 HIV-positive patients (both male) and 3 HIV-negative patients (2 male and 1 female) was obtained. American Type Culture Collection 90028 served as a reference strain. All isolates were identified with sugar assimilation tests and the gerin tube test. Fungicidal assays were per-

formed on exponential *C. albicans* cells in the presence or absence of 0.315 to 50 μm of histatin-5. Numerical data were subjected to 1-way analysis of variance and Tukey's multiple range test ($P < .05$). Results. Histatin-5 (50 μm) killed more than 95% of *C. albicans* isolates from HIV-negative patients and more than 90% of isolates from the reference strain. The same treatment induced 75.3% and 66.1% loss of viability in *C. albicans* isolates taken from HIV-positive patients (A1 and A2 cells, respectively). The difference between the fungicidal effects in the HIV-positive and HIV-negative groups was significant. ($P < .05$). Conclusion. Within the limited population of this study, *C. albicans* isolates from the oral cavities of HIV positive patients were less sensitive to histatin-5 than oral isolates from HIV-negative patients.



O'Donnell D, Sheiham A, Yeung KWS. (2002) The willingness of general dental practitioners to treat people with handicapping conditions: the Hong Kong experience. *Journal of the Royal Society of Health* **122**, 175-180.

Abstract:

A study was carried out to assess the willingness of general dental practitioners in Hong Kong to treat patients with handicaps. A questionnaire and practitioner scale were developed and circulated to 400 general dental practitioners of which 250 responded giving a response rate of 62.5%. The majority of practitioners (59.6%) saw between one and five patients with handicaps per year, 15.6% saw none at all. The mean score was 33.68 (SD = 9.19) on a scale with a range from 0 to 60. The observed mean score, which was just over the halfway mark, indicated a

slightly positive feeling for treating people with handicaps. Cronbach's alpha for the scale was 0.67 for the raw variables. Cronbach's alpha was sufficiently high to indicate a reliable scale for the population under investigation. It was found that although general dental practitioners were relatively enthusiastic about treating people with handicaps they felt it was not economically viable to do so. There was also a strong feeling that government should play a more prominent role in provision of dental care for this group.



O'Donnell D, McPherson B. (2002) Student speech pathologist attitudes to disabled people: is there any need for change? *Asia Pacific Journal of Speech, Language and Hearing* **7**, 111-121.

Abstract:

The attitudes of speech pathologists towards disabled persons may have an impact on the outcomes of the rehabilitation process with disabled clients. Professional education itself can contribute to the formation of positive attitudes to disability and dis-

abled people. This study was designed to survey the attitudes of speech pathology students in Hong Kong towards disabled persons, using the Scale of Attitudes Toward Disabled Persons (SADP). It was found that speech pathology students, in general,

displayed very positive attitudes regarding disabled persons. These attitudes were formed by the time of entry into the educational programme and did not change significantly with course duration. The findings had important education implications for the professional training programme. The SADP was found to be a useful generic measure for educational

programmes when surveying speech pathology student attitudes and educational needs in relation to disability issues. However, more profession-specific measures may also provide an insight into the development of student attitudes over course duration.



Pow EHN, McMillan AS, Leung WK, Kwong DLW, Wong MCM. (2003) Oral health condition in southern Chinese after radiotherapy for nasopharyngeal carcinoma: extent and nature of the problem. *Oral Diseases* 9, 196-202.

Abstract:

OBJECTIVE: To measure the oral health status of southern Chinese nasopharyngeal carcinoma (NPC) survivors 1-4 years after radiotherapy. **SUBJECTS AND METHODS:** A total of 109 subjects participated in this cross-sectional study. Thirty-eight subjects were NPC survivors, 40 subjects were patients newly diagnosed with NPC and 31 were healthy subjects. Verified clinical examination techniques were used to assess limitation of jaw opening, the presence of mucositis, candidiasis, dental caries, periodontal disease [community periodontal index (CPI)] including attachment loss (ALoss) and prosthetic status/need. Differences among three groups were tested by chi-squared and Kruskal-Wallis tests. Relationships between selected clinical variables and radiation parameters were analysed using Spearman's

rank correlation coefficients. **RESULTS:** The NPC survivors attended for dental treatment more frequently than the other groups ($P < 0.01$). NPC survivors had significant xerostomia (92%, $P < 0.01$), trismus (29%, $P < 0.01$), a higher prevalence of clinical candidiasis (24%, $P < 0.01$), a greater DMFT (16.4 +/- 7.0, $P < 0.01$), more decay/filled roots (2.1 +/- 2.9, $P = 0.01$) compared with new NPC patients and controls. No difference was found in CPI, ALoss, prosthetic status and need between groups. Dry mouth and tooth hypersensitivity were the most common oral problems perceived by the NPC survivors. **CONCLUSION:** Despite having regular dental follow-ups, oral health was compromised in NPC survivors 1-4 years postradiotherapy.



Rabie ABM, Hägg U. (2002) Factors regulating mandibular condylar growth. *American Journal of Orthodontics and Dentofacial Orthopedics* 122, 401-409.

Abstract:

Factors regulating condylar growth have not been identified before. This study was designed to identify a series of these factors, such as Sox 9 transcription factor and vascular endothelial growth factor (VEGF), and also to correlate the amount of type X collagen expressed during natural growth to the amount of bone newly formed. We used 115 Sprague-Dawley rats, 35 days old, in this study. The expression of these factors was identified on protein level by using immunostaining. Type X collagen was identified on mRNA and protein levels. Sox 9 was ex-

pressed by cells in the proliferative layer and by chondrocytes. Type X was expressed only by hypertrophic chondrocytes, and its expression precedes the onset of endochondral ossification. VEGF is expressed by hypertrophic chondrocytes, and its maximum level of expression precedes the maximum level of bone formation. Condylar growth involves a sequence of transitory stages uniquely defined by molecules that are intrinsically synthesized by cells in the condyles.

Rabie ABM, Leung FY, Chayanupatkul A, Hägg U. (2002) The correlation between neovascularization and bone formation in the condyle during forward mandibular positioning. *The Angle Orthodontist* **72**, 431-438.

Abstract:

The aim of the present study was to investigate the temporal pattern of expression of VEGF (Vascular Endothelial Growth Factor) and new bone formation in the condyle during forward mandibular positioning. The importance of vascularization during endochondral ossification was investigated during natural growth of the condyle and compared to that after forward mandibular positioning. The goal was to further our understanding of the cellular responses during functional appliance therapy with a view to extending the experiment into maturity. One hundred and fifty 35 days old Sprague-Dawley rats, 100 fitted with a bite-jumping appliance and 50 untreated, were divided into 10 groups. One group was sacrificed on each of experimental days 3, 7, 14, 21, 30, 33, 37, 44, 51 and 60 respectively. Sagittal sections were cut and stained with VEGF antibodies and Peri-

odic acid and Schiff's reagent (PAS). Each section was quantitatively analyzed with a computer assisted analyzing program and the temporal sequence of expression of VEGF and new bone formation during natural growth and after mandibular forward positioning was compared. There was significant increase in both vascularization and mandibular bone growth upon forward mandibular positioning and the highest amount of both were expressed in the posterior region of the condyle. The highest acceleration of vascularization preceded that of new bone formation. Thus, forward mandibular positioning was found to solicit a sequence of cellular events leading to increased vascularization and subsequently new bone formation resulting in enhanced condylar growth.



Rabie ABM, Shum L, Chayanupatkul A. (2002) VEGF and bone formation in the glenoid fossa during forward mandibular positioning. *American Journal of Orthodontics and Dentofacial Orthopedics* **122**, 202-209.

Abstract:

This study was designed to identify the relationship between vascularization and bone formation in the glenoid fossa during natural growth and functional appliance therapy. The temporal pattern of vascular endothelial growth factor (VEGF) expression and bone formation in the glenoid fossa during natural growth was identified and compared with that during forward mandibular positioning. We randomly divided 150 female Sprague-Dawley rats, 35 days old, into 10 experimental and 10 control groups. Appliances were fitted to position the mandible forward in the experimental groups. The rats were then killed at different times. Sections were cut and stained with anti-VEGF antibodies to evaluate VEGF expression, and with periodic acid and Schiff's reagent to

evaluate new bone formation. Both VEGF expression and newly formed bone were measured by a computer-assisted image analyzing system. The results showed that, during natural growth and forward mandibular positioning, VEGF expression and new bone formation were highest in the posterior region of the glenoid fossa. There were significant increases of VEGF and new bone formation in the experimental groups compared with the controls. The highest amount of VEGF expression occurred before the highest amount of bone formation was reached. Forward mandibular positioning causes significant increases in vascularization and new bone formation in the glenoid fossa. A close correlation exists between vascularization and bone formation.

Rabie ABM, Wong LL, Hägg U. (2003) Correlation of replicating cells and osteogenesis in the glenoid fossa during stepwise advancement. *American Journal of Orthodontics and Dentofacial Orthopedics* **123**, 521-526.

Abstract:

The purposes of this study were to quantify the number of replicating mesenchymal cells and to correlate it with the amount of new bone formed in the glenoid fossa during stepwise advancement. We randomly divided 250 female Sprague-Dawley rats, 35 days old, into 10 control groups (n = 5) and 20 experimental groups (n = 10). Fifty rats from the stepwise experimental group received initial advancement of 2 mm and another 1.5 mm of advancement on day 30 by the addition of veneers. On days 3, 7, 14, 21, 30, 33, 37, 44, 51, and 60, the rats were killed. One hour before that, the rats were injected with bromodeoxyuridine (BrdU) intravenously. We cut 7-microm tissue sections through the glenoid fossa sagittally and stained them with anti-BrdU antibody

to evaluate the number of replicating mesenchymal cells. During the first advancement, the number of replicating cells in the posterior region of the glenoid fossa showed a significant increase compared with natural growth, but a significant decrease compared with 1-step advancement. On the second advancement, however, an increase in the number of replicating cells was observed on day 37 with a subsequent and significant increase in bone formation on day 44. Mandibular advancement conducted in a stepwise fashion increases the number of replicating mesenchymal cells in the glenoid fossa. However, a minimum threshold of strain must first be exceeded before these mesenchymal cells can differentiate to ultimately form new bone.



Rabie ABM, She TT, Harley VR. (2003) Forward mandibular positioning up-regulates SOX9 and type II collagen expression in the glenoid fossa. *Journal of Dental Research* **82**, 725-730.

Abstract:

Regulatory factors governing the formation of bone in the glenoid fossa in response to functional appliance therapy have not been identified. Therefore, the purpose of this study was to investigate the temporal pattern of expression of two key chondrogenesis markers-SOX9 and its target gene, type II collagen-in the glenoid fossa by immunostaining in a 35-day-old Sprague Dawley rat model during both natural growth and forward mandibular positioning.

The expression of both factors was up-regulated when the mandible was positioned forward, indicating an enhancement of chondrocyte differentiation and chondroid matrix formation. Our results indicate that chondroid bone formation in the glenoid fossa in response to forward mandibular positioning is regulated by molecular markers indicative of endochondral ossification.



Rabie ABM, She TT, Hägg U. (2003) Functional appliance therapy accelerates and enhances condylar growth. *American Journal of Orthodontics and Dentofacial Orthopedics* **123**, 40-48.

Abstract:

The present study was designed to quantitatively assess the temporal pattern of expression of Sox 9, the regulator of chondrocyte differentiation and type II collagen, the major component of the cartilage matrix during forward mandibular positioning, and compare it with the expression during natural growth. Female Sprague-Dawley rats, 5 weeks old, were used. Results showed that the expression of Sox 9 and

type II collagen are accelerated and enhanced when the mandible is positioned forward. Furthermore, we monitored the amount of new bone formation during mandibular advancement and after the removal of bite-jumping appliances. A substantial increase was observed in the amount of newly formed bone when the mandible was positioned forward. No significant difference in new bone formation could be

found after the appliance was removed when compared with natural growth. Thus, functional appliance therapy accelerates and enhances condylar growth by accelerating the differentiation of mesenchymal cells into chondrocytes, leading to an earlier forma-

tion and increase in amount of cartilage matrix. This enhancement of growth did not result in a subsequent pattern of subnormal growth for most of the growth period; this indicates that functional appliance therapy can truly enhance condylar growth.



Rabie ABM, Tang GH, Xiong H, Hägg U. (2003) PTHrP regulates chondrocyte maturation in condylar cartilage. *Journal of Dental Research* **82**, 627-631.

Abstract:

PTHrP is a key factor regulating the pace of endochondral ossification during skeletal development. Mandibular advancement solicits a cascade of molecular responses in condylar cartilage. However, the pace of cellular maturation and its effects on condylar growth are still unknown. The purpose of this study was to evaluate the pattern of expression of PTHrP and correlate it to cellular dynamics of chondrocytes in condylar cartilage during natural growth and mandibular advancement. We fitted 35-day-old Sprague-Dawley rats with functional appliances. Experimental animals with matched controls

were labeled with bromodeoxyuridine 3 days before their death, so that mesenchymal cell differentiation could be traced. Mandibular advancement increased the number of differentiated chondroblasts and subsequently increased the cartilage volume. Higher levels of PTHrP expression in experimental animals coincided with the slowing of chondrocyte hypertrophy. Thus, mandibular advancement promoted mesenchymal cell differentiation and triggered PTHrP expression, which retarded their further maturation to allow for more growth.



Rabie ABM, Wong LL, Tsai MJ. (2003) Replicating mesenchymal cells in the condyle and the glenoid fossa during mandibular forward positioning. *American Journal of Orthodontics and Dentofacial Orthopedics* **123**, 49-57.

Abstract:

The purpose of this study was to identify and quantify the temporal sequence of replicating mesenchymal cells during natural growth and mandibular advancement in the condyle and the glenoid fossa. One hundred fifty 35-day-old female Sprague-Dawley rats were randomly divided into 10 experimental groups (10 rats each) and 10 control groups (5 rats each). The experimental groups were fitted with appliances that positioned the mandible forward. One hour before the rats were killed, bromodeoxyuridine (BrdU) was intravenously injected into them. Sections were cut and stained with anti-BrdU antibody to evaluate the number of replicating mesenchymal cells. Cellular uptake of BrdU was quantified with the Leica Qwin (Leica Microsystem Imaging Solutions, Cambridge, United Kingdom) system. The results

showed that the numbers of replicating mesenchymal cells during natural growth were highest in the posterior region of the condyle and the anterior region of the glenoid fossa. In the experimental groups, the posterior region had the highest number of replicating cells for both the condyle and the glenoid fossa, with the condyle having 2 to 3 times more replicating cells than the glenoid fossa. The number of replicating mesenchymal cells, which is genetically controlled, influences the growth potential of the condyle and the glenoid fossa. Mandibular protrusion leads to an increase in the number of replicating cells in the temporomandibular joint. Individual variations in the response to growth modification therapy could be a result of the close correlation between mesenchymal cell numbers and growth.

Reichart PA, Samaranayake LP, Samaranayake YH, Grote M, Pow EHN, Cheung BPK. (2002) High oral prevalence of *Candida krusei* in leprosy patients in northern Thailand. *Journal of Clinical Microbiology* **40**, 4479-4485.

Abstract:

Although *Candida albicans* is the most common human yeast pathogen, other *Candida* species such as *C. krusei* are now recognized as emerging agents, especially in patients with human immunodeficiency virus (HIV) disease. *C. krusei* is inherently resistant to the widely used triazole antifungal fluconazole and poses therapeutic problems, especially in systemic candidiasis. In a surveillance study of leprosy patients (with arrested or burnt-out disease) in a leprosarium in northern Thailand, we found a rate of oral carriage of *C. krusei* (36%) significantly ($P < 0.05$) higher than that for a healthy control group (10%). Among the *Candida*-positive patients, 16 of 35 (46%) carried *C. krusei*, while *C. albicans* was the second most common isolate (12 of 35 patients; 34%). The corresponding figures for the control

group were 2 of 13 (15%) and 6 of 13 (46%), respectively. Studies of the antifungal resistance of the *C. krusei* isolates from patients indicated that all except one of the isolates were resistant to fluconazole, two isolates were resistant to ketoconazole, and all isolates were sensitive to amphotericin B. Evaluation of their genetic profiles by randomly amplified polymorphic DNA analysis with three different primers and subsequent analysis of the gel profiles by computerized cluster-derived dendrograms revealed that the *C. krusei* isolates from patients belonged to 10 disparate clusters, despite the origin from a single locale. These nascent findings indicate an alarmingly high prevalence of a *Candida* species resistant to a widely used antifungal in a part of the world where HIV disease is endemic.



Samaranayake LP. (2002) Re-emergence of tuberculosis and its variants: implications for dentistry. *International Dental Journal* **52**, 330-336.

Abstract:

Tuberculosis is one of the deadliest scourges of mankind and, overall, one third of the global population is infected with this mycobacterium or its variants. The advent of the human immunodeficiency virus (HIV) pandemic has accelerated its spread inexorably whilst the multi-drug resistant strains of the bacillus have hampered disease management. Given the alarming spread of the disease, there appears to be a significant potential for occupationally acquired tuberculous infection amongst health care workers,

including dental care workers. This review addresses the basic microbiology and the pathogenesis of tuberculosis, its oral manifestations, mycobacteria other than tuberculosis (MOTT), multi-drug resistant tuberculosis (MDR-TB), management including aspects of the global programme on tuberculosis (DOTS programme), the potential for occupationally acquiring the disease and finally, the infection control measures that are available for dental and other health care workers.



Samaranayake LP. (2003) Severe acute respiratory syndrome (SARS): an interim information paper for dental health care workers. *International Dental Journal* **53**, 117-118.

Samaranayake YH, Samaranayake LP, Dassanayake RS, Yau JYY, Tsang WK, Cheung BPK, Yeung KWS. (2003) 'Genotypic shuffling' of sequential clones of *Candida albicans* in HIV-infected individuals with and without symptomatic oral candidiasis. *Journal of Medical Microbiology* **52**, 349-359.

Abstract:

Although HIV-infected individuals harbour multiple strains of oral *Candida albicans*, little is known of their micro-evolution over time. Therefore, a prospective study was conducted with 16 HIV-infected ethnic Chinese individuals with and without symptoms of oropharyngeal candidiasis to evaluate the genotype distribution of oral *C. albicans* isolates during HIV disease progression. Oral-rinse samples were obtained from all individuals and up to five *C. albicans* colonies were selected for each visit, over a 12 month period of multiple visits. After identification of isolates using standard mycological criteria, the genetic similarities of yeast isolates within and between sequential clones of *C. albicans* were assessed by DNA fingerprinting through random amplification of polymorphic DNA (RAPID). The results of RAPID gel profiles and the lineage of each

isolate were further analysed using commercially available software. RAPID studies revealed the prevalence of up to 14 different genotypes per individual during the study period, with multiple genotypes isolated simultaneously from a single oral rinse. Computer analysis of RAPID profiles revealed that yeasts isolated over sequential visits from symptomatic individuals demonstrated a striking level of relatedness compared with isolates from asymptomatic individuals. Genetically identical *C. albicans* strains also formed 'loosely' connected subclusters that overlapped multiple visits, implying genetic 'shuffling' in these isolates during disease progression. These data point to varying evolutionary genetic trends in *C. albicans* associated with symptomatic oral candidiasis and asymptomatic carriage in HIV disease.



Samaranayake YH, Samaranayake LP, Yau JYY, Dassanayake RS, Li TKL, Anil S. (2003) Phenotypic diversity of oral *C. albicans* isolated on single and sequential visits in an HIV-infected Chinese cohort. *AMPIS* **111**, 329-337.

Abstract:

HIV-infected individuals maintain multiple oral *C. albicans* strains over time that are thought to undergo microevolution in terms of both phenotypic and genotypic features. To study this phenomenon, a 12-month prospective study was conducted in a cohort of 16 HIV-infected ethnic Chinese individuals with (A) and without (B) symptoms of oropharyngeal candidiasis to evaluate the phenotype distribution among oral *C. albicans* isolates during disease progression. Oral rinse samples were obtained and up to five *C. albicans* colony-forming units were selected per each visit, during the one year period of multiple visits. The isolates were phenotyped using two commercially available biotyping kits, the API 20C system, API ZYM system, and a plate test for

resistance to boric acid. A total of 261 *C. albicans* strains in group A were differentiated into 67 biotypes, while 42 biotypes were seen amongst the 182 isolates from group B. The major biotypes in the two groups were similar and were in decreasing order of prevalence J1R, J1S, J6S, MR, J2S, K1S, J10R, K1R, and K6R; 48 different biotypes were seen in group A and 24 in group B, with some uniquely represented in each group, leading to a significant association between the prevalence of the biotypes J1S and J2S and symptomatic candidiasis ($p < 0.05$). Taken together this study illustrates the wide phenotypic spectrum of oral *C. albicans* associated with HIV-infection.

Shen S, Samaranayake LP, Yip HK, Dyson JE. (2002) Bacterial and yeast flora of root surface caries in elderly, ethnic Chinese. *Oral Diseases* **8**, 207-217.

Abstract:

OBJECTIVES: Root caries is emerging as a significant problem in the middle aged and elderly. As little data is available on the microbiology of root caries in Chinese cohorts, we evaluated 30 such lesions in elderly, institutionalized, ethnic Chinese. **METHODS:** Samples of carious dentine were aseptically taken from root caries lesions of 18 subjects (five males and 13 females, mean age 79.67 +/- 8.57). The cultivable bacteria, both aerobic and anaerobic, were isolated and identified using standard methods and commercial identification kits. The yeasts were isolated on Sabouraud's agar and identified using the API system. **RESULTS:** The main findings were: (1) of the total isolates, 91.09% were Gram-positive and 8.91% were Gram-negative microorganisms; (2) the proportions of cocci and rods were 36.68 and 63.31%, respectively; (3) the predominant groups of

organisms isolated were Streptococcus spp., Lactobacillus spp., Staphylococcus spp. and Actinomyces spp. with isolation frequencies of 100, 90.00, 73.33 and 63.33%, respectively; (4) the isolation frequency of yeasts belonging to Candida spp. (63.33%) was notably high although the proportion of yeasts within each sample was low (0.01%). Candida dubliniensis, a newly identified yeast species particularly prevalent in HIV infection, comprised 14.29% of yeasts. **CONCLUSIONS:** This study provides baseline information on the microbiologic features of root caries in the elderly, ethnic Chinese. Whilst our data on the most predominant bacteria isolated in root caries concur with those from other regions of the world the isolation of C. dubliniensis from these lesions has not been documented before.



Sitheeque MA, Samaranayake LP. (2003) Chronic hyperplastic candidosis/candidiasis (candidal leukoplakia). *Critical Reviews in Oral Biology and Medicine* **14**, 253-267.

Abstract:

Chronic hyperplastic candidosis/candidiasis (CHC; syn. candidal leukoplakia) is a variant of oral candidosis that typically presents as a white patch on the commissures of the oral mucosa. The major etiologic agent of the disease is the oral fungal pathogen Candida predominantly belonging to Candida albicans, although other systemic co-factors, such as vitamin deficiency and generalized immune suppression, may play a contributory role. Clinically, the lesions are symptomless and regress after appropriate antifungal therapy and correction of underlying nutritional

or other deficiencies. If the lesions are untreated, a minor proportion may demonstrate dysplasia and develop into carcinomas. This review outlines the demographic features, etiopathogenesis, immunological features, histopathology, and the role of Candida in the disease process. In the final part of the review, newer molecular biological aspects of the disease are considered together with the management protocols that are currently available, and directions for future research.



Siu ASC, Li TKL, Chu FCS, Comfort MB, Chow TW. (2003) The use of lipiodol in spiral tomography for dental implant imaging. *Implant Dentistry* **12**, 35-40.

Abstract:

Preoperative radiographic assessment is mandatory for the meticulous treatment planning and successful placement of implants. The precise topographical evaluation of selected implant sites, apart from the most straightforward cases, requires tomographic examination with the use of diagnostic radiographic templates. The incorporation of various radiopaque materials such as barium sulphate and lead foil as radiographic markers had not been entirely satisfac-

tory. A new contrast medium, Lipiodol ethiodized oil (Laboratoire Guerbet, Paris, France), can easily be mixed with the monomer of autopolymerizing acrylic resin. The resultant acrylic template has several advantages. The tomographic images (Scanora; Soredex Orion Corporation, Helsinki, Finland) are radiographically homogenous and show the contour of the future prosthesis, the angulation of the planned implant, and the thickness of the soft tissue. In addi-

tion, the radiopaque template is optically transparent (with a slight yellow tint), which facilitates good visibility of surgical sites when the template is modified to become the surgical guide for implant placement. This transparent template can be further

modified for implant position registration at the time of surgery. Because this multipurpose template is simple to construct and inexpensive, it can be recommended for routine use in implant dentistry.



Sun CX, He RG, Cheung LK, Zhang ZY, Chen WT, Liu XK, Zhou XJ, Tang ZY, Chen SS. (2002) The biological behaviour of human adenoid cystic carcinoma cells transduced with interleukin-2-gene. *International Journal of Oral and Maxillofacial Surgery* 31, 650-656.

Abstract:

Adenoid cystic carcinoma (ACC) of the salivary glands is a highly infiltrative malignant tumour with a tendency for lung metastasis. Gene therapy could be a potentially effective therapy for ACC and its metastasis. The aims of the study were: To transduce interleukin-2 (IL-2) gene into an ACC cell line with predisposition for lung metastasis (ACC-M); to compare the bioactivity of the gene-transduced cells and the parent cell line in vitro and in vivo. The IL-2 gene was transduced via a bicistronic retroviral vector into the ACC-M cells. The growth rate and DNA cell cycles of the parent ACC-M, the control viral vector AmGCEN, and the gene transduced AmIL-2 cell cultures were compared quantitatively and by flow cytometry, respectively. The tumorigenic ability of the three cell lines was verified by inoculation in athymic nude mice. The tumours developed were extracted and compared quantitatively and histologically. There was no difference in the growth

rate and the DNA count between the ACC-M, AmGCEN, and AmIL-2 cell cultures. In the animal experiment, both the ACC-M and AmGCEN cells stimulated lung metastasis in all the mice, whereas there was no tumour found in the 1 x 10(6) AmIL-2 cells inoculation. On 3 x 10(6) AmIL-2 cells stimulation, three out of six mice developed tumours but the mass and volume of the tumours were smaller than the other two groups. Under light microscopy, the ACC-M tumours were mainly poorly differentiated with minimal cellular matrix, whereas the AmIL-2 tumours were well differentiated with ample matrix. The transduction of IL-2 gene can reduce the tumorigenicity of ACC-M cells and induces tumour cell differentiation in mice. The IL-2 gene can be a potential effective gene for the treatment of adenoid cystic carcinoma of salivary glands and its lung metastasis.



Tang GH, Yip HK, Luo G, Cheung BPK, Shen S, Samaranyake LP. (2003) Development of novel oligonucleotide probes for seven *Actinomyces* species and their utility in supragingival plaque analysis. *Oral Diseases* 9, 203-209.

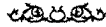
Abstract:

OBJECTIVE: The traditional, biochemical and enzymatic methods of identifying *Actinomyces* species are frequently confounded by the similar phenotypic characteristics shared by the different members of this genus. Therefore, we developed novel species-specific oligonucleotide probes to accurately speciate seven pathogenic *Actinomyces* species, namely, *Actinomyces bovis*, *A. gerencseriae*, *A. israelii*, *A. meyeri*, *A. naeslundii*, *A. odontolyticus* and *A. viscosus*. **METHODS:** A pair of universal primers and seven 15- to 19-base oligonucleotide probes with a tail of 20 thymidines on the 5' end were developed. The variable regions of 16S ribosomal DNA of 36 strains of *Actinomyces* belonging to the above species were amplified and labeled with

digoxigenin, and an oligonucleotide-DNA hybridization assay was performed to examine the specificity and sensitivity of these probes. **RESULTS:** All seven, newly developed probes were specific and sensitive, and accurately detected 36 reference and wild type strains belonging to *Actinomyces* species, without cross-reactions. The probe for *A. naeslundii* detected all strains belonging to the genospecies 1 (12 strains) and catalase-negative genospecies 2 (four strains); it failed to detect catalase-positive *A. naeslundii* genospecies 2 (previous *A. viscosus* serotype II) (two strains). However, the latter strains of catalase-positive *A. naeslundii* genospecies 2 were correctly detected by the probe developed for *A. viscosus*. The new probes were then field tested using

supragingival plaque samples from 28 healthy preschool children. Whilst *A. odontolyticus* was detected in almost all samples (96.4%), *A. gerencseriae*, *A. meyeri*, catalase-negative *A. naeslundii* and catalase-positive *A. naeslundii* genospecies 2 were detected in < 50% samples. CONCLUSION: We con-

clude that the developed oligonucleotide probes, complementary to the variable regions of 16S rDNA, would be of potential value for differentiating *Actinomyces* spp. in clinical samples from the oral cavity and other ecosystems where such species may abound.



Tang GH, Yip HK, Samaranayake LP, Luo G, Lo ECM, Teo CS. (2003) *Actinomyces* spp. in supragingival plaque of ethnic Chinese preschool children with and without active dental caries. *Caries Research* 37, 381-390.

Abstract:

Very limited molecular epidemiological data are available on the role of *Actinomyces* spp. in the pathogenesis of caries in the primary dentition. Therefore, we investigated their distribution in supragingival plaque of ethnic Chinese preschool children from Singapore and Hong Kong, either with or without active caries. Plaque samples were taken from intact interproximal enamel areas using dental floss. Bacterial genomic DNA of each sample was extracted and variable regions of 16S ribosomal DNA amplified and labelled with digoxigenin. Oligonucleotide probes specific for *Actinomyces bovis*, *Actinomyces gerencseriae*, *Actinomyces israelii*, *Actinomyces meyeri*, *Actinomyces odontolyticus*, catalase-negative *Actinomyces naeslundii* (genospecies 1 and 2) and catalase-positive *Actinomyces naeslundii* genospecies 2 (previously *Actinomyces viscosus* serotype II) were used to detect these species using

Southern hybridization with a Minislot and Miniblotter system. *A. odontolyticus*, *A. gerencseriae* and *A. meyeri* were detected with similar frequency in both Singapore and Hong Kong samples or in those with and without active caries. However, the prevalence of *A. naeslundii* was significantly different in the two locales ($p < 0.05$). *A. odontolyticus* (88.7%), *A. gerencseriae* (56.6%) and *A. naeslundii* (50.9%) were detected in a majority of the samples and the positive hybridization signals of *A. gerencseriae* in the caries-active group were stronger than from the caries-free group. *A. bovis* and *A. israelii* were undetectable in any of the samples. These data imply that *A. odontolyticus*, *A. naeslundii* and *A. gerencseriae* may play an important role in supragingival plaque formation on primary teeth in ethnic Chinese, with others such as *A. meyeri* contributing.



Tang GH, Yip HK, Cutress TW, Samaranayake LP. (2003) Artificial mouth model systems and their contribution to caries research: a review. *Journal of Dentistry* 31, 161-171.

Abstract:

The complexity of the oral environment, and ethical problems associated with studies of oral diseases in humans inevitably directed the attention to development of laboratory models, that simulate the human oral microcosm. These developments and in particular the in vitro 'artificial mouth' systems have progressed from simple and basic apparatus devised by Magitot and Miller at the end of 19th century to the currently available, highly sophisticated, computer-controlled, multi-station artificial mouth systems. These advances have metamorphosed from the early studies devised primarily to investigate factors affecting the carious process to the present designs

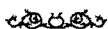
that evaluate growth, pathogenicity, metabolism and mineralization of dental plaque under highly controlled conditions. The modern 'artificial mouth systems' can evaluate microbial interactions in simulated dental plaque and similar biofilms and monitor their physical, chemical, biological and molecular features to a very high degree of accuracy. We review and trace here the historical aspects and developments leading to the currently available artificial mouth systems and discuss their contribution to the study of oral flora, especially related to many variants of dental caries.

Tang GH, Samaranyake LP, Yip HK, Chu FCS, Tsang PCS, Cheung BPK. (2003) Direct detection of *Actinomyces* spp. from infected root canals in a Chinese population: a study using PCR-based, oligonucleotide-DNA hybridization technique. *Journal of Dentistry* 31, 559-568.

Abstract:

Objectives. The poor sensitivity of phenotypic identification techniques has hampered the taxonomic differentiation of *Actinomyces*. Hence we developed a sensitive and specific, PCR-based oligonucleotide-DNA hybridization technique to detect *Actinomyces* spp. and, used this method to detect these organisms in samples directly obtained from infected root canals. **Methods.** A total of 32 samples from 28 Chinese patients, with primary root canal infections, aseptically exposed at the first patient visit, were studied. Whole bacterial genomic DNA was isolated directly from paper point samples. The variable regions of 16S ribosomal DNA of bacteria were amplified and labeled with digoxigenin for further hybridization and detection. A total of seven oligonucleotide probes specific for *A. bovis*, *A. gerencseriae*, *A. israelii*, *A. meyeri*, catalase-negative *A. naeslundii* (genospecies 1 and 2), catalase-positive *A. naeslundii* genospecies 2 and *A. odontolyticus* were used. **Results.** 16 of the 32 teeth were infected with one or more *Actinomyces* species. The prevalence rates of the examined species were: *A. odontolyticus* 31.3%,

A. meyeri 9.4%, *A. naeslundii* 9.4%, *A. israelii* 6.3% and *A. gerencseriae* 3.1%; no *A. bovis* was detected in any of the canals. Furthermore, *A. odontolyticus* was isolated more frequently from root canals with caries or a history of caries (Fisher's exact test: $P=0.0496$; Odds ratio=9.00, 95% confidence interval: 0.97-83.63), and *A. naeslundii* was significantly associated with traumatized teeth (Fisher's exact test: $P=0.0121$; Odds ratio=57.00, 95% confidence interval: 2.10-1546.90). However, no significant correlation was found between *Actinomyces* spp. and clinical symptoms and signs, such as pain, swelling, percussion to tenderness, sinus and periapical radiolucency. **Conclusion.** *Actinomyces* spp. may be important pathogens of root canal infections. *A. naeslundii* in particular may be related with traumatized teeth. *A. odontolyticus* appears to be involved in infections related to caries, exposure of dentinal tubules during cavity preparation and/or leaking restoration, but further clarification with large samples is necessary.



Tay FR, King NM, Chan KM, Pashley DH. (2002) How can nanoleakage occur in self-etching adhesive systems that demineralize and infiltrate simultaneously? *Journal of Adhesive Dentistry* 4, 255-269.

Abstract:

PURPOSE: Single-step adhesives which etch and prime simultaneously and are not rinsed should not exhibit areas of incomplete infiltration within hybrid layers produced in sound dentin. This study examined the extent of silver uptake using ammoniacal silver nitrate in three two-step, self-etching primers (Imperva Fluoro Bond, Shofu; UniFil Bond, GC, ABF system, Kuraray) and one single-step, self-etching adhesive (AQ Bond, Sun Medical) bonded to dentin and four poly(HEMA) resins used as controls. **MATERIALS AND METHODS:** Flat dentin surfaces were bonded with these adhesives and sectioned into 0.8-mm-thick slabs that were then coated with nail varnish except for the bonded interfaces and immersed in AgNO₃ for 24 h. Four types of poly(HEMA) resins were made: 100% HEMA; 90% HEMA-10% water; 75% HEMA-10% water, all polymerized with TBBO at 50 degrees C for 6 h; 100% HEMA polymerized at 25 degrees C for 30 min. After developing, undemineralized, unstained, epoxy resin-embedded sections were prepared for

TEM. **RESULTS:** Nanoleakage patterns were observed in all bonded specimens. Fine segregated silver particles and reticular silver-staining patterns were found within the thin hybrid layers created by the three self-etching primers. For the single-step, self-etching adhesive, heavy silver deposits were identified within the hybridized complex formed by this adhesive within the smear layer, the underlying intact dentin, and in the adhesive layer. Increasing amounts of silver uptake were observed in poly(HEMA) specimens containing more water or that were polymerized at 25 degrees C for a short time instead of 50 degrees C for 6 h. **CONCLUSIONS:** Silver uptake in hybrid layers formed by self-etching adhesives in sound dentin is not necessarily caused by disparities between the depths of demineralization and resin infiltration. They represent areas of increased permeability within a polymerized resin matrix in which water is incompletely removed resulting in regions of incomplete polymerization and/or hydrogel formation.

Tay FR, Pashley DH, Suh BI, Carvalho RM, Itthagarun A. (2002) Single-step adhesives are permeable membranes. *Journal of Dentistry* **30**, 371-382.

Abstract:

OBJECTIVES: This study tested the hypotheses that micro-tensile bond strengths of all currently available single-step adhesives to dentine are adversely affected by delayed activation of a light-cured composite, and that such a phenomenon only occurs in the presence of water from the substrate side of the bonded interface. **METHODS:** In experiment I, a control three-step adhesive (All-Bond 2, Bisco) and six single-step adhesives (One-Up Bond F, Tokuyama; Etch&Prime 3.0, Degussa; Xeno CF Bond, Sankin; AQ Bond, Sun Medical; Reactmer Bond, Shofu and Prompt L-Pop, 3M ESPE) were bonded to sound, hydrated dentine. A microfilled composite was placed over the cured adhesive and was either light-activated immediately, or after leaving the composite in the dark for 20 min. In experiment II, three single-step adhesives (Etch&Prime 3.0, Xeno CF Bond and AQ Bond) were similarly bonded to completely dehydrated dentine using the same delayed light-activation protocol. In experiment III, a piece of processed composite was used as the bonding substrate for the same three single-step adhesives. The microfilled composite was applied to the cured adhesives using the same immediate and delayed light-activation protocols. Bonded specimens were sectioned for micro-tensile bond strength evaluation. Fractographic analysis of the specimens was performed using SEM. Stained, undemineralised sections of unstressed, bonded

specimens were also examined by TEM. **RESULTS:** When bonded to hydrated dentine, delayed light-activation had no effect on the control three-step adhesive, but significantly lowered the bond strengths of all the single-step adhesives ($p < 0.05$). This adverse effect of delayed light-activation was not observed in the three single-step adhesives that were bonded to either dehydrated dentine or processed composite. Morphological manifestations of delayed light-activation of composite in the hydrated dentine bonding substrate were exclusively located along the composite-adhesive interface, and were present as large voids, resin globules and honeycomb structures that formed partitions around a myriad of small blisters along the fractured interfaces. **CONCLUSION:** These features resembled the 'overwet phenomenon' that was previously reported along the dentine-adhesive interfaces of some acetone-based three-step adhesives. The cured adhesive layer in single-step adhesives may act as semi-permeable membranes that allow water diffusion from the bonded hydrated dentine to the intermixed zone between the adhesive and the uncured composite. Osmotic blistering of water droplets along the surface of the cured adhesive layer and emulsion polymerisation of immiscible resin components probably account for the compromised bond strength in single-step adhesives after delayed activation of light-cured composites.



Tay FR, Hashimoto M, Pashley DH, Peters MC, Lai SCN, Yiu C, Cheong C. (2003) Aging affects two modes of nanoleakage expression in bonded dentin. *Journal of Dental Research* **82**, 537-541.

Abstract:

Water sorption into resin-dentin interfaces precedes hydrolytic degradation. We hypothesized that these processes are morphologically manifested by the uptake of ammoniacal silver nitrate, which is thought to trace hydrophilic domains and water-filled channels within matrices. Water sorption is thought to be nonuniform and can be traced by the use of silver nitrate. Human teeth bonded with an experimental filled-adhesive were aged in artificial saliva (experimental) or non-aqueous mineral oil (control). Specimens retrieved for up to a 12-month period were immersed in 50 wt% ammoniacal silver nitrate

and examined by transmission electron microscopy for identification of the changes in their silver uptake. Reticular silver deposits initially identified within the bulk of hybrid layers in the experimental group were gradually reduced over time, but were subsequently replaced by similar deposits that were located along the hybrid layer-adhesive interface. Silver uptake in water-binding domains of the adhesive layers increased with aging, resulting in water tree formation. These water-filled channels may act as potential sites for hydrolytic degradation of resin-dentin bonds.

Tay FR, Pashley DH, Yiu C, Sanares AM, Wei SHY. (2003) Factors contributing to the incompatibility between simplified-step adhesives and chemically-cured or dual-cured composites. Part I. Single-step self-etching adhesive. *Journal of Adhesive Dentistry* 5, 27-40.

Abstract:

PURPOSE: To determine if adverse chemical interaction and adhesive permeability are both responsible for the incompatibility between a single-step, self-etching adhesive and chemically-cured or dual-cured composites. **MATERIALS AND METHODS:** Bonding was performed with Xeno CF Bond (Dentsply-Sankin), on either hydrated (H) or dehydrated (DH) human dentin. For microtensile bond strength evaluation, a dual-cured hybrid composite (Bis-Core) was activated using: (1) the light-cured (L) mode (base syringe only), (2) delayed light activation (DL) (base syringe left on top of cured adhesive in the dark for 20 min before activation), and (3) the chemically-cured (C) mode (base and catalyst syringes in the dark). A chemical co-initiator (B; BondLink) was also applied to the cured adhesive before coupling with the composite in chemically-cured mode. This resulted in seven experimental groups: (1) L-H (control); (2) DL-H; (3) DL-DH; (4) C-H; (5) C-DH; (6) C-B-H; and (7) C-B-DH. For transmission electron microscopy, the dual-cured composite in the seven groups was replaced with a light-cured microfilled composite (Metafil CX) and an experimental chemically-cured microfilled composite of the same composition. Specimens were immersed in ammoniacal silver nitrate for 24 h. After reduction of the diamine silver ions to silver, undemineralized and unstained sections were examined for nanoleakage within the resin-dentin inter-

faces of the seven groups. **RESULTS:** For the light-cured modes, bond strengths fell substantially in DL-H but not in DL-DH. For the chemically-cured modes, bond strengths were lowest in C-H and only increased slightly in C-DH. The use of a chemical co-initiator with the adhesive further improved the bond strength in C-B-H. Only C-B-DH was not significantly different from the control light-cured mode L-H. Two abnormal modes of silver deposition were observed in resin-dentin interfaces. A continuous layer of silver was observed when the chemically-cured composite was applied to the cured adhesive in the absence of the chemical co-initiator (C-H; C-DH). Silver-impregnated water blisters were identified when the chemically-cured composite was coupled to bonded hydrated dentin (C-H; C-B-H). Similar water blisters were seen in DL-H in which adverse chemical interaction should not occur. **CONCLUSION:** Adverse chemical interaction between catalytic components of chemically-cured composite and the tested single-step, self-etching adhesive was the major cause of reductions in bond strength, while adhesive permeability was a minor cause of bond strength reduction. The combination of these two factors accounts for the substantial reduction in bond strength when chemically-cured or dual-cured composites were coupled to bonded hydrated dentin.



Tong AC, Yan BS, Chan TC. (2003) Use of interdental distraction osteogenesis for orthodontic tooth alignment and correction of maxillary hypoplasia: a case report. *The British Journal of Oral and Maxillofacial Surgery* 41, 185-187.



Wei X, Cheung GSP. (2002) Performance of three nickel-titanium instruments for preparing curved root canals to two different apical dimensions. *The Chinese Journal of Dental Research* 5, 32-42.

Abstract:

OBJECTIVES: This study aimed to compare the shaping ability of three nickel-titanium rotary instruments for preparing curved root canals to two different apical sizes. Hand instrumentation using stainless steel files and the Step-down technique

served as the control. **METHOD AND MATERIALS:** A total of 56 moderately curved and 8 "S"-shaped canals in mesial root of extracted human mandibular first and second molars were equally distributed into four groups on the basis of canal

curvature. The teeth were embedded and their roots sectioned horizontally at three levels. Instrumentation was carried out in two phases - first to an apical size of 30 (Phase I), and then to size 40 (Phase II). The pre-operative and post-operative canal shapes of each section were digitized and compared. Longitudinal changes in canal curvature were evaluated on radiographs taken in both buccal-lingual and M-D directions. RESULTS: Hand files produced significantly more straightening than Ni-ti rotary systems, which maintained the canal curvature fairly well in Phase I but did straighten it during Phase II preparation. At the apical two-thirds, hand instrumentation resulted in the greatest amount of dentin removal and canal transportation in both stages of preparation. Significantly thinner canal wall on the furcal aspect resulted from hand files in the mid-root level com-

pared to the Ni-ti systems, which were not significantly different from each other. There seemed to be a difference in the pattern of canal center movement particularly in the mid-root portion among the four groups. More dentin was removed at the coronal third of the canal by Ni-ti instruments with a large body taper. No instrument separation was recorded. CONCLUSIONS: Nickel-titanium rotary instruments resulted in less severe canal transportation than hand instrumentation with stainless steel files. Increasing amounts of canal transportation were evident when the canal was further enlarged from an apical size 30 to size 40, especially with "greater taper" instruments. The Ni-ti systems tested appeared to be safe up to six uses in moderately curved canals.



Wong MCM, Lo ECM, McMillan AS. (2002) Validation of a Chinese version of the Oral Health Impact Profile (OHIP). *Community Dentistry and Oral Epidemiology* 30, 423-430.

Abstract:

OBJECTIVES: To translate the original English version of Oral Health Impact Profile (OHIP) into a Chinese version, to validate the translated instrument for use among the elderly in Hong Kong and to derive a Chinese short-form OHIP. METHODS: The original English version of OHIP was translated into Chinese. Elderly persons aged 60-80 years were interviewed by two trained interviewers and examined clinically by one of two calibrated dentists. Information on subjects' demographic background and oral health conditions were collected. RESULTS: A total of 586 elderly persons were interviewed and clinically examined. Cronbach's alpha of the translated OHIP subscales ranged from 0.69 to 0.84 and the test-retest correlation coefficient ranged from 0.72 to 0.92. Construct validity of the translated Chinese

version was supported by the finding that the OHIP-49 and subscale scores increased as the subject's perceived oral health status changed from healthy to unhealthy. Also, those who had a perceived dental treatment need had higher mean OHIP-49 and subscale scores compared to those who did not. The short-form OHIP derived in this study demonstrated comparable validity and reliability with the full version of OHIP. CONCLUSION: The translated Chinese version of OHIP demonstrated good validity and reliability. It is available for use by researchers in oral health-related quality of life studies in Chinese elderly populations. In situations where a Chinese short-form of OHIP is desirable, there are now two validated Chinese versions for researchers to choose.



Wong RK, Hägg U, Rabie ABM, Lau DW. (2002) Bone induction in clinical orthodontics: a review. *International Journal of Adult Orthodontics and Orthognathic Surgery* 17, 140-149.

Abstract:

The major limitations of autogenous grafting are inadequate supply and surgical morbidity, including donor site pain, paresthesia, and infection. Graft resorption can also pose a severe problem. Bone in-

duction is therefore needed to assist in fracture healing and to fill osseous defects. This article reviewed the current development of bone induction in relation to clinical orthodontics.

Wong RW, Rabie ABM. (2003) Statin collagen grafts used to repair defects in the parietal bone of rabbits. *The British Journal of Oral and Maxillofacial Surgery* **41**, 244-248.

Abstract:

We compared the amount of new bone produced by statin collagen grafts with that produced by collagen grafts. Fifteen bone defects were created in the parietal bone of nine New Zealand White rabbits. In the experimental group, five defects were grafted with simvastatin dissolved in water for injection mixed with absorbable collagen sponge. In the control groups, five defects were grafted with water for injection mixed with absorbable collagen sponge alone (active control) and five were left empty (passive control). Animals were killed on day 14 and the de-

fects were prepared for histological assessment. Serial sections were cut across the whole defect. Quantitative analysis of new bone formation was made on 100 sections using image analysis. A total of 308% more new bone was present in defects grafted with statin collagen grafts than those grafted with collagen grafts alone ($P < 0.0001$). No bone was formed in the passive control group. In conclusion, statin collagen grafts were osteoinductive and can be used as a material for bone grafts.



Woo BMS, Zee KY, Chan FHY, Corbet EF. (2003) In vitro calibration and validation of a digital subtraction radiography system using scanned images. *Journal of Clinical Periodontology* **30**, 114-118.

Abstract:

OBJECTIVES: To calibrate and validate a digital subtraction radiography system using scanned images for quantification of alveolar bone changes by means of computer-assisted densitometric image analysis (CADIA) in vitro. **MATERIALS AND METHODS:** Noise levels were determined using 10 standardized periapical radiographs of the same lower molar region in a human dry skull. For validation of the system, radiographs were taken before and after bovine bone particles in measures with increments of 2 mg weighing from 2 to 20 mg were added into each socket of three dry skulls. Radiographs were developed and scanned into a computer with a flatbed scanner. After digitization, the images were subjected to alignment, normalization and subtraction. Appropriate regions of interest (ROIs) were selected and their CADIA values were calculated for the determi-

nation of noise levels, and correlations between the CADIA values and the actual bone mass were performed. **RESULTS:** When the threshold value was 7, the percentage of pixels deviating from the set threshold value was small (0-11.3%). There were statistically significant correlations between the actual bone mass and the CADIA value for anterior sockets ($p < 0.001$, $r_2 = 0.89$) and posterior sockets ($p < 0.001$, $r_2 = 0.9$). For pooled data of both anterior and posterior sockets, the correlation was also statistically significant ($p < 0.001$, $r_2 = 0.88$). **CONCLUSIONS:** A high and statistically significant correlation between the actual bone mass and CADIA value was obtained, which suggests that the system could be suitable for the detection of small alveolar bone changes.



Xia Y, Wong NS, Fong WF, Tideman H. (2002) Upregulation of GADD153 expression in the apoptotic signaling of N-(4-hydroxyphenyl)retinamide (4HPR). *International Journal of Cancer* **102**, 7-14.

Abstract:

The molecular basis for the pharmacologic effects of N-(4-hydroxyphenyl)retinamide (4HPR) was investigated by studying the gene(s) that this compound may upregulate in cultured human epithelial tumor cells. Treatment of the cultured human nasopharyngeal carcinoma-derived cells (CNE3) with 4HPR caused modest cell-cycle arrest at G(1) and apoptosis. The mRNA levels of a total of 20 genes were

downregulated with the majority of them involved in cell cycle-related functions. Only the mRNA level of the growth arrest and DNA-damage inducible gene (*gadd153*) was upregulated by approximately 7-fold, with a concomitant increase in intracellular protein level. Similar upregulation of *gadd153* by 4HPR was observed in HeLa and 2 other tumor cell lines. The 4HPR-induced apoptosis was markedly enhanced in

the CNE3 cells that transiently overexpressed the gadd153 protein. Unlike 4HPR, all-trans-retinoic acid (ATRA) had no effect on the mRNA or protein level of gadd153. The ability of 4HPR and ATRA to stimulate the promoter activity of gadd153 was then examined. In the HeLa cells, both 4HPR and ATRA caused a 2- to 4-fold stimulation of the promoter activity of gadd153, but similar to the CNE3 cells,

ATRA was incapable of upregulating the protein level of gadd153. This is the first demonstration that gadd153 is a 4HPR-responsive gene in tumor cells and may have a functional role to play in 4HPR-induced apoptosis. Furthermore, our data suggest that the expression of gadd153 can be regulated by 4HPR at the transcriptional level.



Yau WF, Cheng YY, Clark RKF, Chow TW. (2002) Pressure and temperature changes in heat-cured acrylic resin during processing. *Dental Materials* **18**, 622-629.

Abstract:

Objectives: The aims of this study were to measure the pressure and temperature changes of acrylic resin during processing, to record the highest temperature reached when fast cured in boiling water and to determine the elevated boiling point of monomer under high pressure. **Methods:** A subminiature pressure transducer (temperature compensated to 94 degreesC) and a thermocouple were placed on the palate of a standardized maxillary complete denture base. A heat-cured resin (Trevalon Q was polymerized by a long heating cycle (72 degreesC for 6.5 h and 92 degreesC for 1.5 h). Recordings of pressure and temperature (n = 6) were made at initial clamping of denture flasks and throughout the processing cycles of resin. The temperature of the resin was also monitored during a fast cycle, which was accomplished by placing the flask directly into boiling water for 40 min. **Results:** The pressure of acrylic

dough inside the clamped flask was initially 11.5 atm (SD = 3.2) and reached a peak of 22.0 atm (SD = 3.5) during the long heating cycle. The elevated boiling point of monomer at increased pressure was calculated to be about 193 degreesC (at 11.5 atm) and 228 degreesC (at 22.0 atm). These elevated boiling points are higher than the maximum temperature 131 degreesC (SD = 6.6) reached during the fast curing cycle. No porosity was observed even in the denture bases heat-cured by the fast cycle. **Significance:** The highest temperature reached by heating of resin during processing is well below the elevated boiling point of monomer. Monomer therefore does not boil in clamped denture flasks under sufficient pressure. Thus adequate clamp pressure prevents gaseous porosity irrespective of curing cycle used. (C) 2002 Academy of Dental Materials. Published by Elsevier Science Ltd. All rights reserved.



Yip HK, Mui MS, Smales RJ, Newsome PR, Chow TW, Sham ASK. (2002) Assessment of endodontically treated teeth adjacent to proposed implant sites. *Implant Dentistry* **11**, 349-355.

Abstract:

Many partially dentate dentitions are now being restored using dental implants; but assessment of endodontically treated teeth adjacent to the proposed implant sites has seldom been reported. Assessment criteria are given for sound- and endodontically com-

promised teeth to ensure adequate preimplant preventive and restorative treatment and to minimize the chances of failure of dental implants adjacent to these teeth. Cases are used to illustrate pitfalls in the treatment planning process.

Yip HK, Smales RJ, Gao W, Peng D. (2002) The effects of two cavity preparation methods on the longevity of glass ionomer cement restorations: an evaluation after 12 months. *Journal of the American Dental Association* **133**, 744-751.

Abstract:

BACKGROUND: The authors undertook a study to evaluate the effect of two cavity preparation methods on the initial survival of two more-viscous glass ionomer cements, or GICs, placed in the occlusal surfaces of permanent molar teeth. **METHODS:** Three dentists placed 149 restorations in 68 adult patients in a hospital clinic. They used either atraumatic restorative treatment, or ART, or conventional cavity preparation methods to place two encapsulated esthetic conventional GICs: Fuji IX GP (GC International Corp., Tokyo) and Ketac-Molar Aplicap (3M ESPE, Seefeld, Germany). For comparison, they used high-copper-content GK Amalgam Alloy (Advanced Technology & Materials Co. Ltd., Beijing) in conventional preparations. They evaluated the restorations using both direct and indirect observation methods. **RESULTS:** Cavity preparations for which the authors used ART hand instruments took approximately twice as long to complete as did those for which they used conventional rotary instruments. After 12 months, no restorations had failed, but restorations comprising both

GICs showed early losses of adjacent sealant material. Both GICs also showed relatively high restoration wear. At 12 months, the mean cumulative net occlusal wear for Fuji IX GP was 77 +/- 47 micrometers, and for Ketac-Molar 83 +/- 51 microm, without statistical significance (P > .05). Color matching improved significantly with time (P < .001), without significant differences in color between the two GICs by 12 months (P = .09). The amalgam alloy had minor surface tarnishing and marginal discrepancies increased with time (P < .001). **CONCLUSIONS:** All of the occlusal restorations were rated as satisfactory after 12 months. The method of cavity preparation did not affect the restoration performance of the GICs. However, their deterioration requires long-term monitoring. **Clinical Implications.** The more viscous GICs appear initially suitable for restricted use in clinical practice when placed using either of two cavity preparation methods in the occlusal surfaces of permanent molar teeth in adults.



Yip HK, Smales RJ. (2002) Health-related quality of life of dental patients attending a primary care unit. *International Journal of Health Education* **40**, 100-104.

Abstract:

Objective: To determine the impact of more severe, but commonplace, dental problems on Hong Kong Chinese patients' health-related quality of life. Design Chinese-translated SF-36 Health Survey questionnaires were completed by 93 dentate patients who were attending a Primary Care Unit, mainly for the treatment of dental pain and advanced periodontal conditions. **Results:** Most patients were in good

stable general health, with few limitations to their physical, emotional and social functioning. These latter findings were similar to those found for the general Hong Kong population in another recent normative study. **Conclusion:** The use of the generic SF-36 questionnaire appears to have little application for routine dental treatment management in a dentate Chinese population.



Yip HK, Fang DT, Smales RJ, Newsome PR, Chow TW. (2003) Rotational path of insertion for removable partial dentures with an anterior saddle. *Primary Dental Care* **10**, 13-16.

Abstract:

The provision of removable partial dentures remains a viable treatment modality for many partially dentate patients. Replacing missing anterior teeth with a removable partial denture using a rotational path of insertion provides improved retention and appearance. The use of a rotational path of insertion

also provides additional retention for a removable partial denture restoring combined anterior and posterior bounded saddles. Two case reports demonstrate the use of the rotational path of insertion for partial denture design.

Yip HK, Chow TW, Chu FCS. (2003) Rehabilitating a patient with bruxism-associated tooth tissue loss: A literature review and case report. *General Dentistry* **51**, 70-74.

Abstract:

Tooth tissue loss from bruxism has been demonstrated to be associated with various dental problems such as tooth sensitivity, excessive reduction of clinical crown height, and possible changes of occlusal relationship. A literature search revealed a number of treatment modalities with an emphasis on prevention and rehabilitation with adhesive techniques. Rehabilitating a patient with bruxism-associated tooth tissue loss to an acceptable standard of oral health is clinically demanding and re-

quires careful diagnosis and proper treatment planning. This article describes the management of excessive tooth tissue loss in a 43-year old woman with a history of bruxism. The occlusal vertical dimension of the patient was re-established with the use of an acrylic maxillary occlusal splint, followed by resin composite build-up. Full-mouth oral rehabilitation ultimately involved constructing multiple porcelain veneers, adhesive gold onlays, ceramometal crowns, and fixed partial dentures.



Yip HK, Smales RJ, Kaidonis JA. (2003) Dahl appliances used for the restorative management of localized anterior tooth erosion. *General Dentistry* **51**, 54-57.

Abstract:

Dahl partial bite-raising appliances have been used in the past 30 years for the management of occlusal tooth tissue loss, particularly in patients who have lost normal occlusal vertical dimension. The more recent use of Dahl-type appliances for individual teeth has changed the restorative management of patients with localized anterior tooth erosion. The

Dahl treatment principle can be applied to those patients with and without the loss of occlusal vertical dimension. Palatal bite-raising platforms can be used to re-establish anterior tooth guidance for disocclusion of the posterior teeth without occlusal interferences. The treatment principle is illustrated with clinical cases.



Yip HK, Smales RJ, Kaidonis JA. (2003) The diagnosis and control of extrinsic acid erosion of tooth substance. *General Dentistry* **51**, 350-353.

Abstract:

As modern societies increase their acidic food and beverage consumption, erosive tooth wear is an increasing cause of tooth destruction among young people. The primary causes can be exacerbated by xerostomia, which can be induced by dehydration, several systemic diseases, or any of a number of drugs. Initial preventive treatments are directed at

eliminating extrinsic acids, reducing xerostomia and other cofactors, and increasing teeth's resistance to acid. Initial restorative treatments should be conservative, using adhesive materials. Treatment of advanced tooth tissue loss is difficult; preventive management is emphasized.



Yip HK, Smales RJ. (2003) Oral rehabilitation of young adults with amelogenesis imperfecta. *International Journal of Prosthodontics* **16**, 345-349.

Abstract:

Purpose: This article describes the restorative management of two patients in whom the diagnosis of amelogenesis imperfecta was not made until young adulthood. Materials and Methods: Amelogenesis imperfecta is a variable developmental abnormality of the tooth enamel that affects relatively few persons. Previous case reports have focused largely on the early management of children and young adolescents. However, some patients may not be diagnosed correctly or may not request dental treatment until they are older, as with the two cases presented.

in some instances, parents fail to appreciate the importance of early intervention. Results: Both patients required intensive preventive therapy and extensive restorative treatment over several years. The correct sequencing of treatment phases was required to achieve relief of pain and provide satisfactory function and esthetics. Conclusion: The two cases presented illustrate the degree of complexity that extended restorative treatments can involve, especially following severe tooth wear and poor bonding of restorations to the affected enamel.

Yiu C, Garcia-Godoy F, Tay FR, Pashley DH, Imazato S, King NM, Lai SCN. (2002) A nanoleakage perspective on bonding to oxidized dentin. *Journal of Dental Research* **81**, 628-632.

Abstract:

The mechanism responsible for sodium-hypochlorite-induced reduction in dentin bond strength and its reversal with reducing agents is unknown. This study examined the relationship between nanoleakage and reversal of compromised bonding to oxidized dentin. Acid-etched dentin was completely depleted of demineralized collagen matrix when sodium hypochlorite was used. Specimens were bonded with two single-bottle dentin adhesives. They were immersed in ammoniacal silver nitrate for 24 hrs before being processed for transmission electron microscopy. For both adhesives, tensile bond

strengths of acid-etched dentin were significantly reduced after sodium hypochlorite treatment, but were reversed when sodium ascorbate was used. After sodium hypochlorite application, reticular nanoleakage patterns in hybrid layers were replaced by vertical, shag-carpet-like patterns along the demineralization front. This type of nanoleakage was completely eliminated after sodium ascorbate treatment with the materials tested. Residual sodium hypochlorite within the porosities of mineralized dentin may result in incomplete resin polymerization, and hence compromised bond strength.



Zee KY, Bratthall G. (2003) Prevalence of cervical enamel projection and its correlation with furcation involvement in eskimos dry skulls. *Swedish Dental Journal* **27**, 43-48.

Abstract:

The objectives of this study were to investigate the prevalence of cervical enamel projection (CEP) in molars of Eskimo dry skulls and to study the correlation of CEP with furcation involvement (FI). The material consisted of 834 upper and lower first and second permanent molars from 133 Eskimo dry skulls. CEPs were investigated from the buccal aspect of the tooth and classified according to a system modified from Masters & Hoskins (12). FI was measured horizontally from the buccal aspect into the furcation with a graduated probe to the nearest mm. Any measurement > or = 2 mm was considered

to have positive FI. The result showed a presence of 72% of CEPs among the examined molars. Grade III was found in 53%, Grade II in 9% and Grade I in 11% of the 834 molars. Lower molars had a higher prevalence of CEPs (78%) than upper molars (67%). With the individual skull used as the unit for analysis, a statistically significant correlation of CEP with FI was found in upper right 2nd molar, upper left 1st molar, lower left 1st and 2nd molars and lower right 1st molar. These results may be of clinical importance since the impact of CEPs to periodontal treatment of FIs has been discussed.



Zee KY, Bratthall G, Söderholm G. (2003) Implication of cervical enamel projection to furcation involvement in molars. A pilot clinical study. *Swedish Dental Journal* **27**, 105-113.

Abstract:

The aim of this study was to investigate the correlation of cervical enamel projection (CEP) with furcation involvement (FI) and compare the healing response of molars with or without CEP after surgery. A total of 30 patients contributing 78 maxillary and mandibular first or second molars were included. Plaque Index (PII), Gingival Index (GI), probing pocket depth (PPD) and probing attachment level (PAL) were measured before surgery and 1 and 3 or 6 months postoperatively. During surgery, CEPs were identified and classified with a modified grading system from Masters & Hoskins (24). FI was measured horizontally from the buccal aspect into the

furcation with a graduated probe to the nearest mm. Any measurement > or = 1 mm was considered as FI. CEPs were found in 33 molars (42%). Grade III CEPs were found in 14 teeth, Grade IIb in 4 teeth, Grade II in 1 tooth and Grade I in 14 teeth. The results showed no significant correlation of CEP with FI. Nor was CEP significantly affecting the PPD and PAL 3 or 6 months after surgery. However, FI was a significant factor in the further loss of PAL after surgery. Further studies, involving larger sample size may be necessary in order to give more conclusive results.

Zhou Y, Hägg U, Rabie ABM. (2002) Severity of dentofacial deformity, the motivations and the outcome of surgery in skeletal Class III patients. *Chin Med.J.(Engl.)* **115**, 1031-1034.

Abstract:

OBJECTIVE: To study the relationship between severity of skeletal Class III malocclusion and the patient's emotional status, as well as motivation for seeking surgical correction and satisfaction with the outcome of the surgery. **METHODS:** One hundred and forty consecutive Chinese patients with skeletal Class III malocclusion who had been treated with a combined orthodontic and surgical approach were studied. Sixty-seven percent (40 males and 54 females) responded to a questionnaire. Fifty-four percent had two jaw deformities, 32% mandibular hyperplasia and 14% maxillary hypoplasia. **Surgical procedures:** 77% received two jaw surgeries, 15% maxillary advancement and 8% mandibular setback. This was a retrospective study based on questionnaires with numerical scale ranked answers (0: not at all; 1: a little; 2: moderately; 3: quite a bit; and 4: extremely). **RESULTS:** ANB angle was significantly

negatively correlated with feelings about the nickname related to their facial problems (embarrassment: $\gamma = -0.30, P < 0.01$; worn out $\gamma = -0.32, P < 0.01$; angry $\gamma = -0.24, P < 0.05$). ANB angle also had a significant negative correlation with the reasons for having the surgery (pressure from their friends: $\gamma = -0.21, P < 0.05$, and referred by physician: $\gamma = -0.24, P < 0.05$). Changes in life style as a result of surgery were significantly negatively correlated with the ANB angle before treatment, positive influence on relationships with the opposite sex ($\gamma = -0.25, P < 0.05$), positive influence in social activities ($\gamma = -0.22, P < 0.05$). **CONCLUSION:** The psychological status before surgery and the outcome following orthognathic surgery in patients with skeletal Class III malocclusion were closely related to severity of the malocclusion.

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Lu MM. (2003) Allogenic bone grafts mixed with basic fibroblast growth factor. A cellular and molecular study.

Abstract:

This study was designed to develop a totally allogenic bone graft that would eliminate the need for harvesting autogenous bone from the patients. This allogenic graft material consisted of allogenic intramembranous (IM) bone and basic fibroblast growth factor (bFGF) reconstituted in demineralized bone matrix prepared from intramembranous bone (DBMIM). Further objectives of the current study were: To elucidate the cellular and molecular mechanism by which bFGF augments the osteoinductivity of allogenic IM bone grafts. To identify the cells involved in the healing of this composite allogenic bone grafts. To examine the factors involved in resorption of allogenic bone grafts and compared it to autogenous bone. To examine the microarchitecture of autogenous bone grafts in three-dimensions. Eighty-four critical size (15 × 10 mm) defects were created on rabbit mandibles bilaterally. Five groups of twelve defects each were respectively grafted with autogenous endochondral (EC) bone, autogenous intramembranous (IM) bone, allogenic IM bone alone, allogenic IM bone and DBMIM powder, and allogenic IM bone and bFGF reconstituted in DBMIM powder. The remaining defects were used as controls. Animals were killed at three weeks and three months postgrafting. The defects were retrieved for histology, transmission electron microscopy, micro-computed tomography, immunohistochemistry and *in situ* hybridization. Quantitative analysis was performed using an image analyzer. No

bone formed across the defect in controls. Composite allogenic IM bone-bFGF-DBMIM graft produced 550% more new bone than did allogenic IM bone alone 3 weeks postgrafting ($p < 0.001$), and more new bone than did autogenous EC bone. The increase (517%) in the expression of vascular endothelial growth factor (VEGF) mRNA was accompanied by an increase (492%) of immunoreactive VEGF protein in allogenic bone grafts augmented by bFGF reconstituted in DBMIM 3 weeks postgrafting. Light and electron microscopic analysis showed that there were a large number of bone-making cells and blood vessels across the whole defect where the abundant new bone was evident in composite allogenic IM bone-bFGF-DBMIM graft 3 weeks postgrafting. The parallel between matrix metalloproteinase-9 (MMP-9) expression and bone graft resorption 3 months postgrafting suggested that bone resorption was accomplished in part by increased MMP-9 production evident in pre-osteoclasts and osteoclasts. Micro-computed tomography showed the different microarchitectural features of autogenous IM and EC bone grafts in three-dimension. Composite allogenic IM bone and bFGF reconstituted in DBMIM powder is a good graft material which warrants further clinical investigation. Basic-FGF reconstituted in DBMIM augments the healing of allogenic bone grafts by enhancing vascularization through the up-regulation of VEGF in the grafted area. Healing of the composite allogenic IM bone-bFGF-DBMIM graft

is greatly accelerated by the presence of bFGF and DBMIM through an increase in recruitment of osteoprogenitor cells, differentiation and proliferation of osteoblastic cells, and capillary invasion. Allogeneic IM bone grafts and autogenous IM bone grafts express lower levels than autogenous EC

bone grafts of MMP-9, leading to more resorption of the EC bone grafts. The use of micro-computed tomography is an excellent method to examine integration of bone grafts.



Peng L. (2003) Effects of the Headgear-Activator appliance. A prospective study.

Abstract:

The overall aim of this prospective study was to evaluate the effects of the headgear-activator (van Beek, 1982) during both active treatment and retention in the treatment of growing Chinese children with skeletal Class II malocclusion. This investigation was conducted by applying a longitudinal cephalometric prospective study design in which a sample of consecutively treated patients was followed before treatment, during treatment and retention. By deducting facial changes due to growth from changes occurring during treatment it was possible to estimate the treatment effects of the headgear activator as well as effects during retention. The original sample was 57 children with skeletal Class II division I malocclusion. Each patient was treated with a specific headgear-activator (van Beek, 1982) and at the end of treatment the 'headgear-bows' were cut and the "activator" was used for retention. Prior to treatment, records were obtained from each patient to obtain data on normal growth changes. Of the 57 patients who met the selection criteria (18f, 39m) and enrolled in the study, 43 patients (15f, 28m) completed the headgear-activator treatment, 30 patients completed the retention stage and the remaining 13 patients were still in retention

when the present study was completed. The skeletal and dental treatment changes were investigated by conventional assessment of cephalometric changes in dento-facial morphology (Björk, 1947). The sagittal and vertical changes were also evaluated using the method of Pancherz (1982a, 1982b), based on the occlusal plane and the condyle changes using mouth-open cephalograms (Pancherz and Hägg, 1985). All treated subjects had the molar relationship and the overjet corrected. The results indicated that 8 months of active treatment with the specific headgear activator (van Beek, 1982) resulted in statistically significant improvement in overjet and overbite (*i.e.* reduction) molar relationship, and jaw base relationship. The statistically-significant sagittal skeletal treatment effects were restraint of maxillary forward growth and enhanced mandibular forward growth, whereas the dental treatment effect was only protrusion of mandibular incisors. The statistically-significant vertical skeletal treatment effect was of increase in lower facial height, whereas the dental treatment effects were intrusion of the maxillary incisors and extrusion of the mandibular molars. During 6 months of retention there were no statistically-significant effects different from

normal growth changes. It was concluded that this HeadGear-Activator (van Beek, 1982) is an effective appliance in correcting Class II division 1 malocclusion on Chinese subjects. The appliance enhanced

forward mandibular growth and restricted maxillary forward growth. Effects achieved during active treatment were stable after 6 months of retention.



Sun L. (2002) The molecular cytogenetics of oral squamous cell carcinoma.

Abstract:

Oral cancer is the eighth most common cancer worldwide and is one of the leading causes of cancer health. oral squamous cell carcinoma (OSCC) accounts for over 90 percent of these tumors. Compared to other malignancies, less cytogenetic and molecular genetic data on OSCC has been documented, and the genetic mechanisms involved in the pathogenesis and progression of this disease remain poorly understood. This thesis seeks to illustrate the genetic alterations of OSCC at the molecular cytogenetic level, to construct a chromosomal aberration map and oncogenetic tree model, to evaluate and refine the candidate genes, and to characterize and identify the potential biomarkers that correlate with its clinical behavior. We screened the entire genome for imbalanced genetic alterations in 60 OSCCs by comparative genomic hybridization (CGH). Our CGH results provide several entry points for the isolation of candidate oncogenes at 3q, 5p, 8q and tumor suppressor genes at 3p, 4q, 9p and 17p. It is noteworthy that the frequent 6q loss and 2p, 20q gains were revealed for the first time in our OSCC series. In addition, the association between chromosomal aberrations with clinical features was established. It has been shown that the gains of 2p, 3q, 20q, and the 4q

loss were significantly more frequently present in metastatic patients than in non-metastatic patients. Meanwhile, there was a significant relationship between 17p loss and well-differentiated tumors. Using computer science and our CGH data, a tree model of oncogenesis was constructed, suggesting that gains of 3q and 5p were the important early events in OSCC, while losses of 6q, 19q and gains of 7p and 8p were correlated with late stages of the tumors. According to the CGH results, five bacterial artificial chromosome DNA fragments were used as probes for inter-phase FISH analysis, in order to confirm the results of CGH and to narrow down the aberrant regions. The BAC clones included eIF-5A2 (3q26.1), c-myc (8q24.1), cyclin D1 (11q13), AIB1 (20q12), and 1q21. Our results indicated that these genes were the target genes of amplification in CGH. The study illustrated that, combined with molecular cytogenetic techniques, I-FISH and CGH have revolutionized the analysis of complex karyotypes of OSCC, have greatly increased the sensitivity for detecting genetic numeric abnormalities and may be invaluable as a prognostic indicator. Based on the results of CGH and I-FISH, several commercially available antibodies, AIB1, c-myc, cyclin D1, p16, and p53

were selected. In addition, a rapid and high throughput technique, tissue microarray analysis (TMA), was constructed and applied to 82 OSCC. Our study indicated that over-expression of AIB1, p53 and negative expression of p16 were significantly associated with regional lymph node metastasis. cyclin D1 over-expression was significantly observed in small, well-differentiated OSCC. In contrast, positive c-myc expression was more commonly in large-sized tumor. Our study is the first time to

apply comparative genomic hybridization (CGH), inter-phase fluorescence *in situ* hybridization (I-DISH) and tissue microarray (TMA) to reveal molecular cytogenetic alterations of OSCC. It reveals that incorporating molecular, cytogenetic and immunohistological information together with conventional clinico-pathological features will facilitate the development of more accurate prognostic criteria OSCC patients.



Zhang Q. (2002) Maxillectomy reconstruction by transport distraction osteogenesis.

Abstract:

Maxillectomy defects bring formidable challenges for aesthetic and functional reconstruction. Traditional approaches by autogenous tissue transfer cause donor morbidity, which may cause prolonged recovery and residual deformities. This study aimed to (1) define bone thickness in the various anatomic regions of the maxilla as potential fixation sites for a maxillary bone-borne distractor and to compare the holding strength of different fixation systems; (2) explore the feasibility of maxillectomy reconstruction by transport distraction osteogenesis in a primate model; (3) define the bony architectures of the distraction regenerates by plain radiography and microcomputerized tomography scan at defined consolidation intervals; (4) identify the histological healing process of bone formation, the soft tissue, the dental changes and the types of collagen fibers in the maxillary distraction gap; and 5) demonstrate the expression of BMPs in the maxillar

during the consolidation period of distraction osteogenesis. Firstly, for the stability of the distractor design, screws of 1.5 or 2.0 mm in diameter and 3-screw mini-plates in triangular or straight configurations were evaluated for holding strength by using tests in fresh animal bones (1, 2, and 4 mm in thickness). The bone thickness for the test covered the representative bone thickness in the five regions of maxilla (paranasal, infra-orbital, zygomatic, posterior sinus wall, and alveolar regions) according to cortical bone thickness measured by CT scan on 10 skulls. The test results showed that the 2.0-mm screws were stronger than the 1.5-mm ones when engaged in the 2-mm and 4-mm bones. However, the pullout behaviour of single screws in 1 mm thick bone and the mini-plates in two different configurations showed no significant differences. In 14 rhesus monkeys (*Macaca mulatta*), a unilateral maxillectomy defect was created involving the resection of the

last two molars and supporting alveolus. Immediate bone transport surgery included mobilization of dentoalveolar segment holding two premolars and a first molar, and fixation of the transport distractor. After a latency of five days, transport distraction was activated at the rate of 1 mm once daily for about 15 days to move the dentoalveolar segments into the defects. Transport distraction was successful in six animals. Three other cases were completed with minor wound dehiscence and one with small oro-antral fistula and subsequent maxillary sinusitis. The final results demonstrated the feasibility of maxillectomy reconstruction by transport osteogenesis with a suitable design of maxillary distractor. The distracted dentoalveolar specimens were harvested at different consolidation inter-

vals (1, 2, 3, and 6 months). The specimens underwent plain radiography, microcomputerized tomography scanning and evaluation, histological analysis and immunostaining for Type I and II collagens and bone morphogenetic proteins (BMPs-2 to 7). Radiography and histology results demonstrated bony union in the distraction gap as early as 1 month after distraction. The trabecular pattern underwent progressive mineralization and remodeling within three months of consolidation. The mode of ossification was mainly intramembraneous with the dominance of Type I collagen. BMPs were found to participate in bone maturation and remodeling of the new bone during consolidation after distraction.

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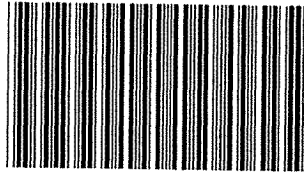
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