1217 Kinematics of the Herbst Appliance.

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This study evaluates the 3-D functional movements of the mandibular condyles and incisors both with and without the Herbst appliance. For each of ten young adult volunteers fitted with a removable Herbst appliance, maximum ranges of motion and movements while chewing gum were evaluated: 1) without an appliance (WO), 2) with an unactivated appliance (UA), and 3) with an activated appliance (AA). Movements (100 Hz) were recorded using the Optotrac system; simultaneous EMG activity (300 Hz) was recorded for the masseter and anterior temporalis muscles. The results showed that during maximum opening the Herbst significantly increased the posterior movement of the anterior mandible (4-5mm, measured at the incisors) and decreased the anterior movement of the condyles (2 mm). Maximum jaw protrusion (3-5mm) and retrusion (1-3mm) were also reduced. Maximum lateral excursions of the anterior mandible (measured at the incisors) were reduced 6-7mm; AP condylar movements were also restricted. A decrease in muscle activity and an increase in the variability of the ranges of motion was found with the UA and AA groups. Mandibular movements while chewing gum were significantly more variable for the UA and AA groups than for the WO group. Ranges of vertical and posterior movements while chewing gum increased with UA and AA; the range of lateral movements increased with UA but decreased with AA. We conclude that the Herbst 1) restricts border movements, 2) differentially affects the anterior mandible (incisors) and condyles, 3) produces asymmetric movements of the condyles, and 4) increases variability in chewing patterns. Supported by the Baylor Center for Craniofacial Research and Diagnosis.

1218 Cephalometric Analysis of Anterior Facial Height and Maxillary Posterior Alveolar Development.

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Clinicians have long accepted the importance of controlling posterior alveolar vertical dimension in the orthodontic treatment of those individuals possessing vertical growth tendencies. Most therapies focus on vertical control of the maxillary and mandibular alveolar processes. Myofunctional therapy, biting exercises, equilibration, headgear, chin cup, bite-plane (magnetic/nonmagnetic), extraction and jaw surgery are used singly or in combination to control the anterior and posterior facial and alveolar vertical dimensions. The purpose of this study was to analyze treatment changes in the anterior and posterior face heights as well as the posterior alveolar heights of both jaws as a consequence of upper permanent first molar extraction orthodontic therapy. The experimental group consisted of 26 subjects, 14 female and 12 male, with a mean sample age of 13.5 years. Subjects were selected based on the criteria of high pre-treatment mandibular plane angle and the therapeutic extraction of maxillary permanent first molars. Post-treatment experimental variables were compared to a matched, untreated control group with high mandibular plane angles. Paired t-testing of pre- to post treatment changes revealed statistically significant changes in total, upper and lower face heights as well as mandibular posterior alveolar height ($p < 0.05$). T-test comparison of control versus post-treatment variables reveal significant differences in the maxillary ($p < 0.05$) and the mandibular ($p < 0.02$) posterior alveolar heights. Upper permanent first molar extraction therapy can result in a significant decrease in maxillary and mandibular posterior alveolar height dimensions for patients presenting with high pre-treatment mandibular plane angles.

1219 Cephalometric Comparisons of Chinese and Caucasian Surgical Class III Patients.

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The purpose of this study was to compare the craniofacial morphology of Chinese and Caucasian Class III patients who were treatment planned for orthognathic surgery. Lateral cephalometric radiographs of 30 Chinese and 30 Caucasian patients were included in the study to analyze for race and sex differences. Twenty skeletal and dental measurements were evaluated. Two sample t-test was used for the comparisons of the two groups. The results show that cranial base length (71.2 ± 2.3 mm vs. 75.6 ± 3.6 mm, $p < 0.01$) and maxillary length (47.9 ± 3.5 mm vs. 49.3 ± 2.6 mm, $p < 0.01$) were significantly shorter in the Chinese sample. However, maxillary alveolar bone and incisor teeth showed marked labial inclination with or without correcting for the caudal deflection of the cranial base in Chinese sample (Yen, PKJ Angle Orthod 43:301, 1973). Mandibular length (88.6 ± 4.9 mm vs. 85.7 ± 3.4 mm, $p < 0.05$) was larger in the Chinese sample and the incisors were more proclined (68.8° ± 5.4° vs. 61.7° ± 6.1°, $p < 0.05$). Facial height and relationship of ramus to cranial base were relatively comparable to those of Caucasians. These results suggest that there are morphological differences between these two ethnic groups which may require different approach in treatment planning for orthognathic surgery.

This study was supported by The University of Hong Kong.

1220 3-year Clinical Evaluation of a Dentin Adhesive System in Cervical Abrasions.

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The clinical behavior of Prisma Universal Bond 3 was evaluated with the light-cured composite resin Prisma AP.H when used to restore cervical abrasion lesions in adults. Ninety four restorations were placed in 38 patients. Experimental groups included: Group A, cervical restorations placed with no etching of the enamel: Group B, cervical restorations including the acid etching of beveled enamel margins. A rubber dam was used during all procedures. Dentin conditioning was conducted for 60 seconds. The adhesive was light polymerized for 20 seconds and the composite was incrementally placed to normal anatomic form. Criteria evaluated using the Ryge (USPHS) method included: retention, color match, marginal integrity, marginal discoloration, anatomic form, secondary caries and post-operative sensitivity. At 3 years, 3 patients were lost which resulted in a recall rate of 92.1%. Results indicated that 37 of 40 restorations in group A (92.5%) and 39 of 40 restorations in group B (97.5%) were fully retained at 3 years. There was no evidence of secondary caries in either group. Marginal discoloration ratings were 83.8% alpha for group A and 90.8% alpha for group B. Marginal integrity ratings were 81.9% alpha for group A and 82.5% alpha for group B. Remaining criteria were found to be rated excellent.

1221 1-Year Clinical Study of Sclerotic vs Non-Sclerotic Dentin Bonding.

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Dentin sclerosis jeopardizes bonded Class V restorations [Heymann *et al. J Am Dent Assoc* 1991; 122:41-47]. This study evaluated sclerotic vs non-sclerotic dentin effects on the clinical performance (USPHS categories, sensitivity, retention) for one dentin bonding system (DBS).

44 non-sclerotic (type 1) and 45 sclerotic (type 4, [Heymann, Bayne. *J Am Dent Assoc* 1993; 124:26-36]) sites were restored using Gluma 2000 (Bayer) DBS, Pekafil (Bayer) composite, non-retentive preparations, and dried dentin to maximally challenge dentin bonding. Lab tests showed good bonding [Yamamoto, Finger. *J Dent Res* 1994; 73:131, Abstr 234]. Extensive pre-op site characterization was reported previously [Bayne. *J Dent Res* 1994;73:275, Abstr 1388]. Clinical evaluations (% alfa) were performed at baseline and 1-year.

Sclerosis Type	N=	Color match	Marginal discolor.	Recurr. decay	Wear	Marginal integrity	Surface texture	Post-Op Sens.	Retention
1 (Baseline)	45	100%	100%	100%	100%	100%	100%	96%	100%
1 (1-Year)	42	96%	93%	100%	100%	93%	96%	83%	64%
4 (Baseline)	44	98%	100%	100%	100%	100%	100%	98%	100%
4 (1-Year)	43	96%	88%	100%	100%	100%	100%	98%	53%

Minor changes in USPHS categories (see table) were observed over 1 year. Substantial retention loss occurred by 1 year with more loss in the sclerotic dentin category (Chi Square, $p \leq 0.05$). The most critical period of clinical evaluation for DBS's is the first 6 months to 1 year. High levels of retention failure proved this system was not optimally bonded. Dentin drying prior to bonding may have been more important than sclerosis, but failures were 33% more frequent in the sclerotic group. If dentin hydration were preserved during bonding, the sclerosis effect might be smaller. (Supported in part by Bayer.)

1222 Clinical Evaluation of Extensive Restoration of Amalgam and Composite Resin.

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The purpose of this study was to evaluate the clinical conduct of extensive restorations of amalgam and composite resin of twenty five endodontic treated teeth(pre molars and molars).The teeth were selected for each group based on clinical and radiographs exams of the dental remaining.After restored with composite resin(P-50 and Scotchbond II Adesive) or amalgam (Standalloy),each tooth had a casts Velmix made,with silicone impressions. The patients came back in 3, 6, 12 and 18 months for a clinical and radiographs assessment and new casts,and scored as 0,1,2 and 3.

Materials	Standart Deviation	Total Extent	Average
Amalgam	0,33	0,62	0,43
Composite Resin	1,01	2,00	1,13

The results were treated by Main - Whitney U Test.Based on the results,the authors concluded that the amalgam group showed better and more homogeneous results than composite resin group ($p<0,05$).The composite restorations had different performance through the time ($p<0,01$),supporting that more satisfatory technique was that used amalgam.

1223 Failure Differences of Posterior Resin Composite, Amalgam and Metallic Crown Restorations.

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Longitudinal data, based on controlled, clinical studies performed at universities, suggest that the half-life for posterior composite restorations is 14-18 years (Bayne, 1991), almost as long as that of amalgams. This study was conducted to determine if the success of posterior composites placed in general practice was equivalent to the findings of clinical studies. A random sampling of restorations requiring endodontic treatment was collected from four endodontists. Restoration inclusion criteria were as follows: 1) O, MO, DO, or MOD amalgam, composite or crown; 2) intact, *i.e.*, no detectable fractures in the tooth or restoration; and 3) endo treatment within the last 2 years. Cards were sent to referring dentists asking for the age and type of the restorations in the 350+ identified teeth, and any prior restorations. The data, based on a >50% response rate, was analyzed using Kruskall-Wallis and Mann-Whitney U tests. The differences in the length of time between placement and endo treatment were: for composites, median = 18.0 wk (range 0.1-175 wk); for crowns, median = 136.5 wk (range 5.0-711 wk); and for amalgams, median = 339.5 wk (range 2.0-1049 wk). Composites had a significantly shorter age span than crowns ($p=0.004$) or amalgams ($p=0.0002$). The difference between crowns and amalgams was not significant. Admittedly, looking at failed restorations skews the data. Still the *age at failure* for amalgam restorations was 10 times that of composites, while for crowns, it was more than 5 times that of composites. These findings pose a question as to the actual half-life for posterior composites. This research was funded by Baylor College of Dentistry Research Funds.

1224 Two Year Evaluation of a Hybrid Composite for Posterior Restorations.

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This study evaluates the clinical suitability of a quartz filled composite (Pertac) for restoration of posterior teeth. Five Class I and forty-six Class II restorations in thirty-nine patients were restored. Restorations included 43 molars and 8 premolars. Cavity preparations were protected with calcium hydroxide and/or a glass ionomer base. Enamel was etched for 30 seconds with 37% H_3PO_4. Dentin was conditioned with Universal Bond and unfilled resin was placed, cured, and restored in 2mm increments. Restorations were finished using diamond burrs and polishing paste. Evaluation was at 0, 6 months, 1 year, and 2 years using the USPHS system and M-L indirect scale. At 0 time, 51 restorations were Alpha in all categories using two independent evaluators. At the 6 month, 40 restorations were Alpha in all categories. At the 1 year recall, 33 restorations were graded Alpha in all categories except for 1 Bravo for marginal integrity. At the 2 year recall, 31 restorations were graded with one additional Charlie for marginal integrity. Wear analysis revealed, on average, 2 microns of wear at the 6 month interval, 7.6 microns of wear at the 1 year interval, and 13.4 microns of wear at the 2 year interval. In conclusion, a quartz filled hybrid composite material demonstrates excellent clinical acceptability in all categories assessed along with minimal wear, making it suitable for restorations of posterior teeth.