The relationship between eruption and length of mandibular incisors in young rats

A dissertation submitted to the
University of Hong Kong
in partial fulfilment of the requirement for the

Advanced Diploma in Paediatric Dentistry

by

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2001

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Abstract

Introduction:

Rat incisors were frequently used to study the eruption process because of their unlimited growth. In the literature, the relationship between the eruption rate and the length of the clinical crown was postulated to be existed. And the eruption rate would be changed after shortening the tooth.

Objective:

The objectives of this study were to use an image analysis technique to measure changes in the eruption of mandibular incisors in rats. And to analyse the data determine if a correlation existed between the eruption rates and the length of the clinical crowns of the teeth.

Materials and methods:

Over 4 weeks, the mandibular right incisors of 11 rats were shortened every 2 or 3 days. A group of 12 rats served as a control for comparison.

Results:

The mean unimpeded eruption rate was 1.03±0.11mm/day, while the impeded eruption rate was 0.59±0.12mm/day. Over the study period, when the rate of eruption of impeded incisors increased, the length of the clinical crown was reduced.

Conclusions:

An inverse relationship exists between the eruption rate and the length of clinical crown of the impeded mandibular incisors. And the unimpeded eruption rate was unrelated to the length difference between the left and right incisors if the length difference exceed 0.5mm after accelerated eruption.

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Introduction

The rat incisor is a unique model for studying the growth and development of dental tissues, it is a continuously growing and erupting structure which is effectively renewed every 40 to 50 days (Schour and Massler 1949). The odontogenic tissues maintain their potential for growth and differentiation during the animal's life span. Therefore, the complete cycle of tooth development from inception to maturity is manifest in a single tooth. In addition, the rat incisor is also a sensitive recorder of variation in mineral metabolism (Lozupone and Favia 1994) because these events are permanently engraved on the enamel and dentine.

A better understanding of the process of eruption of rodents' incisors, although not directly applicable, can lead to a better appreciation of the process involved in teeth with limited growth cycles such as those of the human (Main and Adams 1965). Using the rat as a model, the postulated mechanisms of tooth eruption have been tested (Bryer 1957, Berkovitz 1972, Tsuruta et al 1974); the cell migration and proliferation of the inner enamel epithelium during eruption have been studied histologically (Michaeli et al 1972); and the effect of function on eruption have also been investigated (Michaeli et al 1974, Burn-Murdoch 1994).

The normal eruption rates of rat incisors are approximately 2.2mm and 3.0mm per week in the maxilla and mandible respectively (Addision and

Appleton 1915, Shadle et al 1936, Weinreb et al 1967). Ness (1965) stated that the eruption rate of rodent teeth was independent of their metabolic rate. In addition, the effect of rat's sharpening movements have a much greater influence on eruption than does the consistency of the diet (Addison and Appleton 1915, Taylor and Butcher 1951, Weinreb et al 1967, Burn-Murdoch 1993b).

Generally, the eruption rate of an unimpeded incisor can increase by as much as 200% after shortening of the tooth, when compared with the adjacent impeded incisor (Taylor and Butcher 1951, Schour and Medak 1951, Bryer 1957, Risnes et al 1995). However, there is an immediate and marked reduction in the eruption rate after re-establishment of occlusal contact (Taylor and Butcher 1951). In maxillary incisors, the peak of unimpeded eruption is reached on the second day; while in the mandibular incisor, it continues to increase until the fourth day (Michaeli et al 1974, Tsuruta et al 1974, Risnes et al 1995). However, in a study by Chiba and his co-workers (1976), the maximum acceleration of eruption of unimpeded mandibular incisors was obtained two days after shortening.

Interestingly, studies have indicated that the eruption rate increases and the crown length of the impeded incisor tends to decrease, after the adjacent incisor becomes unimpeded and then it is slowly returns to normal (Ness 1965, Chiba et al 1968, Chiba et al 1973, Burn-Murdoch 1990, Burn-Murdoch 1992, Burn-Murdoch 1993b, Risnes et al 1995).

It has also been suggested that the change in eruption rate of incisors is correlated to the sum of the lengths of the clinical crown of the maxillary and mandibular incisors (Burn-Murdoch 1992, Burn-Murdoch 1993b). An inverse correlation between the impeded eruption rates and the combined crown length of the maxillary and mandibular impeded incisors implies that tooth length can be influenced by eruption rates (Burn-Murdoch 1993b, Burn-Murdoch 1994, Burn-Murdoch 1995, Burn-Murdoch 1999). A strong correlation exists between the change in crown length and the eruption rate of impeded mandibular incisors immediately after shortening, with a faster eruption rate is being associated with shorter teeth (Burn-Murdoch 1994, Burn-Murdoch 1995). Furthermore, there is also a significant correlation between the difference in eruption rates and the difference in the crown length of the left and right incisors (Burn-Mordoch 1995). Also the unimpeded eruption rate is negatively correlated to the length difference between the impeded and unimpeded incisors (Burn-Murdoch 1993b).

The rat incisor is also frequently used in the study of enamel formation because the tooth forms continuously and all of the stages of enamel development are always present. Under condition of accelerated growth, the enamel of the unimpeded incisor gradually losses translucency and yellow-orange pigment, and becomes white and opaque (Taylor and Butcher 1951, Michaeli and Weinreb 1968b), which is probably due to failure of deposition of pigment (Taylor and Butcher 1951). Histological studies of the rat incisors have revealed that ameloblasts remain normal

and maintain the columnar pattern up to the gingival margin (Schour and Massler 1934, Schour and Medak 1951, Michaeli and Weinreb 1968). However, the extend of changes in the thickness of enamel under accelerated eruption remains controversial; it has been said to be only about half that of normal incisors (Taylor and Butcher 1951), to be an one-third reduction in thickness (Michaeli et al 1982, Steigman et al 1989, Risnes et al 1995, Risnes et al 1996) and for there to be no difference in matrix thickness in both impeded and unimpeded teeth (Michaeli and Weinreb 1968, Robinson et al 1988).

However, there is general agreement that the thickness of dentine decreases under conditions of accelerated eruption. In unimpeded incisors, owing to the almost doubled eruption rate, only half of the normal thickness of dentine is formed; probably due to the reduced time for appositional growth, a concomitant increase in pulp size is expected (Taylor and Butcher 1951, Michaeli and Weinreb 1968, Michaeli et al 1982, Sieigman et al 1989). The rate of dentine growth in length is almost double; by contrast, the growth in width is unaffected (Michaeli and Weinreb 1968, Michaeli et al 1982). Histologically, the odontoblasts appear to be normal and active (Schour and Massler 1934, Taylor and Butcher 1951); however, the apposition of dentine starts much farther incisally than in normal teeth (Michaeli and Weinreb 1968). By contrast, the basal end of an unimpeded tooth shows an increase in the number of cells in mitosis (Michaeli and Weinreb 1968, Ohshima and Chiba 1981).

In the literature, various methods have been utilized for the direct measurement of the eruption rate of rodent teeth. The use of microscopy with a graticule in the eyepiece is one of the most widely accepted methods (Addison and Appleton 1915, Taylor and Butcher 1951, Bryer 1957, Michaeli and Weinreb 1968, Burn-Murdoch 1994, Burn-Murdoch 1995, Burn-Murdoch 1999, Risnes et al 1996); however, permanent records cannot be created by this method.

The use of radiographs and a measuring scale or grid has been shown to give a reasonable estimation of the eruption rate of mandibular incisors in rabbits (Ness 1965) and rats (Main and Adams 1965, Lavelle 1969). For the taking of continuous measurements, in a short time interval, variable capacitance displacement transducers have been successfully used (Matthews and Berkovitz 1972, Moxham 1979). Fine calipers with a digital voltmeter (Weinreb et al 1967) have been advocated for measuring magnified photographs (Chiba et al 1973, Tsuruta et al 1974). In this study, a computer-aid technique was used to capture an image which was subsequently measured. This method is simple, quick and has a high level of sensitivity. The use of irradiation is avoided and permanent records can be obtained. In addition, this quick-snap image analysis technique can overcome the problem of head movement which occurs in anaesthetized rats when performing measurements under microscopy.

The objectives of this investigation were to study the changes of magnitude in the eruption process of impeded and unimpeded incisors of

young rats and to explore any correlation that may exist between the eruption rate and the length of the clinical crown.

Materials and methods

During a period of four weeks, the eruption rates and length of the clinical crown of the mandibular incisors of 23 Sprague-Dawley female rats, 7 to 8 weeks of age, were recorded every 2 or 3 days. In the experimental group, the mandibular right incisors of all the 11 rats were shortened three times per week on Monday, Wednesday and Friday mornings so as to eliminate the effect of circadian variation and to keep handling of the rats to a minimum. In the control group, 6 rats were sacrificed after 3 weeks, while the remaining 6 rats were kept until the end of the experiment.

All the rats were housed in a room with artificial illumination between 0700 hours and 1900 hours each day. The temperature and humidity were maintained at constant levels of 21°C ± 1°C and between 55% to 73% respectively. Two or three rats were caged in a group and fed on standard laboratory autoclavable rodent diet pellets (PMI Nutrition International Inc.) and took water *ad libitum* from a bottle with a metal delivery tube.

Under a stereomicroscope (Nikon SMZ-10) equipped with a graded eyepiece and a colour video camera (JVC TK 1080E), the images of both incisors were captured and saved for future analysis. Before measurements were taken, a 10mm micrometer with one graduation

equivalent to 100μm was utilized to calibrate the graticules in the eyepiece and the digital image in a Macintosh computer.

At each session, after being anaesthetized by an intraperitoneally injection of Ketamine (67mg/kg) and Xylazine (6.7mg/kg), each rat was weighted on an electronic balance with an accuracy of up to 0.1 gram. In both the control and experimental groups, horizontal marks were created on the labial surface of each mandibular incisor just below the level of the interdental papilla, using a slow speed rotary diamond disk (Horico H362F 080) with a thickness of 0.18mm. For the rats in the experimental group, the mandibular right incisors were shortened to the level of interdental papilla. The cut fragments of the teeth were collected and stored in 10% formaldehyde solution.

Using the most caudal point of the gingival margin of the left mandibular incisors as a reference point, a virtual reference line was drawn from this point, perpendicular to an imaginary line through the interdental space between the mandibular incisors, on the image (Figure 1). The length of the clinical crown and distances from the reference plane on the gingival margin to the mid-point of the marks on the labial surface of both incisors were measured digitally (NIH Image Version 1.61).

On each occasion eight readings were collected from each rat; the length of the clinical crown of the unshortened incisors in the control and

experimental groups were measured a second time after an interval of 5 minutes. From the readings, the rates of eruption and attrition were calculated.

Statistics

The differences for the individual groups were compared by paired t-tests, while the intra-group difference was compared using the Student-Newman-Keulis Multiple Comparison Test. A correlation was assessed by the Pearson correlation coefficient (r). The results were expressed as means to one standard deviation, while the 'p' value of $p<0.05$ was taken to be statistically significant.

Results

Reliability

On each day, measurements of the length of the clinical crown of both mandibular incisors from the control group and the left impeded mandibular incisors in the experimental group were taken twice. Therefore, a total of 349 pairs of repeated measurements from day 2 to day 25 could be used to test the reliability of the image analysis technique. The calculated mean for the method error of this technique was 0.059, which ranged between 0.026 and 0.141. Paired t-tests also showed that there was no statistically significant difference between initial and repeated measurements on each day from both groups except for the readings from the right incisors in the control group on day 2 ($p=0.0328$).

The experimental procedure was tolerated well by all of the rats which appeared healthy and normal up to the end of the experiment. The mean body weight of the rats in the control and the experiment groups increased steadily; by 31.5% in the control group and by 26.1% in the experimental group. No statistically significant difference was found between the experimental and control groups for each of the consecutive days (Figure 2).

Length of the clinical crown of the mandibular incisors

The length of the clinical crowns of the impeded incisors in the experimental and control group lengthened steadily throughout the experimental period; by 8.8% in the experimental and by 12.1% in the control group. In the control group, after day 14, the length of the mandibular incisors was significantly longer than the length between day 0 to day 11 ($p<0.05$). A similar phenomenon occurred for the impeded mandibular incisors in the experimental group, but only on day 28 ($p<0.05$). However, there was a significant reduction in length of the clinical crown of the impeded incisors by 7.3% in the experimental group 2 days after shortening of the adjacent tooth ($p<0.0001$). Afterwards, the length of the impeded mandibular left incisors in the experimental group were generally shorter than in the control animals on each consecutive pair of measurements during the study period (Figure 3).

The length differences of the left and right mandibular incisors in the experimental group were calculated. Immediately after mechanical shortening of right incisors, the mean length difference was 2.92±0.23 mm, which ranged from 2.47 to 3.35mm. Since the right incisors were shortened every 2 or 3 days, the mean length differences after accelerated eruption at different time intervals were calculated separately. In 2-day intervals, the mean length difference was 0.76±0.14, which ranged from 0.50 to 0.96mm. However, the mean length

difference, after a 3-day interval was reduced to 0.26±0.17mm (range: 0.11-0.45mm).

Attrition

In the control group, the amount of attrition on both incisors remained constant during the experimental period (right: $p=0.45$, left: $p=0.18$). The mean attrition rate of both incisors was 0.58±0.06mm per day. In addition, there was no statistical differences in the attrition rates ($0.96>p>0.28$), or the amount of attrition ($0.96>p>0.28$) between the incisors based on each pair of measurements.

In the experimental group, the mean attrition rate of the left incisors was 0.58±0.16mm per day. The mean attrition rate of the left impeded incisors on days 0 to 2, at 1.00±0.12mm/day, was significantly higher than for the rest of the study period ($p<0.001$). The means of the consecutive pairs of measurements for the attrition rates and amount of attrition between the left impeded incisors in the control and experimental groups were analyzed. Relatively higher attrition rates and greater amounts of tooth substance were lost in the period for day 0 to day 2, which when compared to the control, were highly statistically significant difference at the $p<0.0001$ level. By contrast, the attrition rates and amount to tooth substance worn away in the control group on days 4 to 7, 11 to 14, 18 to

21 and 25 to 28 were significantly higher than for the left incisors in the experimental group (Figure 4).

Eruption

In the control group, by taking the average value for the left and right incisors, the eruption rate was 0.61± 0.09mm per day, which ranged from 0.51 to 0.67mm per day. Analysis of variances showed that there was no statistically significant differences in the eruption rates for both of the mandibular incisors in the control group except on days 2 to 4 ($p=0.02$) and days 18 to 21($p=0.04$), of which the right incisors erupted much more slowly. The eruption rate of the left incisors remained constant throughout the experimental period ($p=0.82$).

In the experimental group, the mean rate of eruption of impeded incisors was 0.59±0.12 mm per day, with a range from 0.48 to 0.75mm per day. In addition, the unimpeded incisors erupted at the rate of 1.03±0.11mm per day, with a range of 0.96 to 1.14mm per day, which represented an acceleration up to 174.58%. The unimpeded eruption rate tended to increased when mechanical shortening was performed every 2 days; however, it suddenly dropped after the 3-day interval. By contrast, the eruption rate of impeded incisors rose on day 2. Afterwards, it generally demonstrated a slowly declining eruption rate (Figure 5). In the first week, the unimpeded eruption rate of the mandibular right incisors rose to

reached a peak 4 days after shortening; however, there was no significant difference between day 2 and day 4 (p=0.41). Further analysis on consecutive pairs of measurements of the left impeded incisors in the control and experimental groups revealed that, during days 0 to 2, the eruption rate in the experimental group was 23.0% faster than in the control group (p=0.0066). As a result, the ratio of acceleration, while comparing the unimpeded eruption rate to the impeded eruption rate either to the adjacent tooth, or to the control group, there was a difference. On day 2, the right unimpeded mandibular incisors accelerated by up to 133.33% when compared to the adjacent incisors and by up to 163.93% when compared to the left incisors in the control group. Subsequently, there was no difference in eruption rates from day 4 to day 18. By contrast, after day 9, the eruption rates of the impeded incisors in the experimental group were generally slower than the control. Nevertheless, the differences that did occur on days 18 to 21 (p=0.016) and 25 to 28 were significant (p=0.0077) (Figure 5).

Eruption rates versus length of clinical crown of mandibular incisors

The distance between the incisal edge of the impeded incisor and the cut end of the unimpeded incisor (clearance of the unimpeded incisor) was measured and recorded before and after shortening of the right incisors. The mean values of the eruption rates and the mean of the length

differences between the left and right mandibular incisors from each day were analyzed and correlated. A positive correlation existed between the mean unimpeded eruption rates and the mean length differences, after accelerated eruption (r=0.606, p=0.0367). However, if the data obtained from the four 3-day intervals were discarded, then the rates of unimpeded eruption of mandibular right incisors did not correlate to the length differences after accelerated eruption (r=-0.3997, p=0.3266).

Also, no relationship could be established between mean unimpeded eruption rates and mean length differences, immediately after mechanical shortening of right incisors (r=-0.2270, p=0.4779). Also, there were no correlation between the mean impeded eruption rates to the mean length differences, immediately after shortening (r=0.1633, p=0.6121); nor to the mean length difference after accelerated eruption (r=0.1893, p=0.5557).

When the data for the eruption rates and the tooth length were analyzed, for the experimental group, the mean rate of eruption of the mandibular impeded incisor was negatively correlated to its tooth length; hence a shorter tooth was associated with a higher eruption rate (r=-0.8811, p=0.0002).

Discussion

From the literatures, it appears that the optical microscope, radiographs and photographs are the most commonly used methods to measure the eruption of rodent's incisors. Only the current series of studies has been identified that used a computer as the recording medium and no other study has used this technique to calculate the eruption rate of rat's incisors. In this study, the reliability of the image analysis method was evaluated by taking repeat measurements of the length of the impeded incisors of rats in both the experimental and control groups during the experimental period. Most of the readings (96.6%) did not show any statistical difference between the first and repeat measurements. The relatively low value of the calculated mean method error further indicated that the accuracy of this measuring technique was high. In a current series of experiments, which compared this image analysis method to the classical optical microscopic method, confirmed that the image analysis method was at least as accurate as the optical method.

This study showed immediate reductions of length of the clinical crown in the impeded incisors and transient acceleration, when the adjacent incisor were mechanical shortened. Similar results have been described in the literature (Chiba et al 1968, Burn-Murdoch 1990, Burn-Murdoch 1994, Burn-Murdoch 1995). There was only a temporary reduction because the clinical crown length continued to increase and so reached the control value before the end of the investigation. Although the

eruption rate soon returned to normal in the first week, as the experiment proceeded it slowly declined. Burn-Murdoch (1994, 1995) reported that, after a mandibular incisor was rendered unimpeded, the length of the clinical crown of the impeded mandibular remained shorter than the length of a control tooth. However, the rate of eruption elevated initially and then after ten days, returned to the level which was similar to control group (Burn-Murdoch 1994, Burn-Murdoch 1995). When the current results for the first eleven days of the current study are compared with those of Burn-Murdoch (1994, 1995), they also demonstrate a similar pattern of changes in tooth length and eruption rate. However, the present study displays a different result when the experimental period continues up to 28 days.

The variation in eruption of impeded or unimpeded incisors is postulated to be related to changes in the lengths of the teeth; or to the sum of the lengths of the clinical crown of the maxillary and mandibular incisors; or to the differences between the left and right incisors (Burn-Murdoch 1993b, Burn-Murdoch 1994, Burn-Murdoch 1995). Generally, there is agreement that the change of consistency of diet does not affect the eruption rate (Weinreb et al 1967, Burn-Murdoch 1993b). In 1965, Ness showed that no significant correlation was found between impeded and unimpeded eruption rates (Ness 1965). In the present study, when the relationship of the eruption rates and changes in crown length were analyzed; for impeded incisors, a negative correlation was shown to exist for the association between increasing crown length and the reduction of

the impeded eruption rate. However, according to Burn-Murdoch's studies, there is an inverse correlation between the impeded eruption rates of the incisors and the sum of the crown lengths of the mandibular and maxillary incisors; the longer the length the slower the eruption rate (Burn-Murdoch 1992, Burn-Murdoch 1993a, Burn-Murdoch 1994, Burn-Murdoch 1995). However, there were certain limitations in his studies because experimental periods were relatively short and the sample sizes were smaller than in the current study. The changes of the crown length of the impeded incisor, when the adjacent tooth was shortened, suggested that it could be related to the alteration of the biting behaviour of the rats and the deliberately shortening their incisors (Burn-Murdoch 1994). Previous studies have also concluded that movements by rats to sharpen their teeth have more of an effect on the eruption rates than eating (Taylor and Butcher 1951, Weinreb et al 1967, Burn-Murdoch 1993b). In the current study, the level of the occlusal plane was changed during the experimental period. Michaeli and her co-workers (1974) studied the consequences of the shortening of both mandibular incisors in young rats and subsequently suggested that the altered level of the occlusal plane acted as a regulating factor which stimulated the eruption of the short incisors and inhibited the eruption of the long incisors (Michaeli et al 1974). However, this does not fully explain the present results because the final crown length of the impeded incisors returned to the control level while the rate of eruption remained depressed.

When the variables related to the eruption rates of the unimpeded mandibular incisors and changes in crown length, a correlation existed between the unimpeded eruption rate and the length difference between both mandibular incisors after accelerated eruption; the larger the length difference the greater the eruption rate. This situation can be explained by the greater the distance between the adjacent incisors after shortening of the unimpeded tooth, there is less chance of the unimpeded tooth establishing occlusal contact with the opposing tooth after 2- or 3-day intervals. Therefore, unimpeded incisors can be expected to fully express their eruption potential after mechanical shortening. Also, it is not surprising that the eruption rate is not related to any length difference between the two incisors immediately after mechanical shortening, since this is controlled by the operator and so is not a physiologically related variable.

While comparing the rate of eruption and attrition of impeded and unimpeded incisors, most studies utilized the adjacent teeth as the control (Bryer 1957, Taylor and Butcher 1951, Main and Adams 1965). However, based on the results of the current study, it is important to include an individual control group for comparison, especially during the initial stage of the experiment. This can be best illustrated by what occurred to the impeded incisors in the experimental group on Day 2. After the right mandibular became unimpeded, the eruption of both the impeded and unimpeded incisors accelerated. The rate of impeded eruption became elevated, to a level even higher than that of the control

group; similar results have also been reported by several other investigators (Chiba et al 1976, Burn-Murdoch 1994, Risnes et al 1995). Therefore, if the neighbouring teeth are used to calculate the degree of elevation in the unimpeded eruption rate, the result will not reflect the true increase; which was 163.9% for the control compared to 133.3% for the adjacent tooth. Similarly, the rate of attrition of impeded incisor also rose to a maximum after 2 days; which was significantly higher than any reading in either the experimental or control groups. Thus, it is recommended that the results obtained from the experimental group at day 2 should be compared to those of a separate control group.

In order to obtain unimpeded eruption of rat incisors, most of the investigators have suggested shortening the rats' incisors every two days (Bryer 1957, Main and Adams 1965, Burn-Murdoch 1992). However, there is an absence of evidence to prove that mechanical shortening of the mandibular incisors in young rats every two days is sufficient to allow unimpeded eruption. As the experiments in current study, were conducted on Monday, Wednesday and Friday mornings, it is inevitable that the rats' mandibular incisors would be either shortened at 2- or 3-day intervals. The unimpeded eruption rate kept increasing if the tooth was shortened every two days and the length difference between both incisors was usually greater than 0.7mm after accelerated eruption. By contrast, the calculated impeded and unimpeded eruption rates, and the attrition surprisingly declined during the 3-day interval and were followed by a reduction of crown length in the impeded incisors; a similar situation

was also observed after the adjacent incisor was first rendered unimpeded at day 2. Further analysis of the length difference between the left and right incisors after a 3-day period revealed that the mean length difference was commonly less than 0.5mm. Interesting seven measurements were obtained for the crown lengths of the unimpeded incisors that were even longer than their neighbouring impeded incisors after 3-day intervals. The possible reason to for this fluctuation in the eruption rates is that, after mechanical shortening of the incisors every two days, these shortened incisors remained unimpeded until they were shortened again. However, after three days of accelerated unimpeded eruption, the unimpeded incisors may have resumed occlusal contact, and so both incisors shared the occlusal stresses generated during oral functions. Ness (1965) reported that wear facets on the cut surface of unimpeded incisor were detected after three days and that the cut incisors grew nearer to an occlusion contact than they did over the shorter interval (Ness 1965). An immediate and marked reduction in eruption rate commonly occurs after re-establishment of occlusal contact with the opposing tooth (Taylor and Butcher 1951, Burn-Murdoch 1999). Even after an interval of two days, occlusal contact between opposing incisors, can occur (Michaeli et al 1974). Although Burn-Murdoch's studies in 1995 recognized that wear facets could be detected on the cut end of unimpeded mandibular incisors in young rats after a 2-day interval, he concluded that it produced only a negligible effect on the eruption rate (Burn-Murdoch 1995). Furthermore, if the length difference is greater than 0.5mm after accelerated eruption, the incisor can be

considered fully unimpeded (Burn-Murdoch 1999). Similarly, the current study also proved that, provided the length difference was greater than 0.5mm after accelerated eruption, the eruption of the unimpeded mandibular incisors did not correlate to the length difference between the left and right incisors. Results from the present study also indicated that the unimpeded eruption rate was approximately 1mm per day. If the length difference between adjacent incisors is less than 3mm after mechanical shortening, the chance of restoration of occlusal contact of those unimpeded incisors should be relatively high. Therefore, the findings of this study provide evidence to support the notion that, in the young rat, the mandibular incisors have to be shortened at 2-day intervals when studying the unimpeded tooth eruption.

In the present experiment, all of the rats tolerated the experimental environment and procedures. Generally, the body weight of the rats increased steadily throughout the experimental period which can be explained by the fact that young rats were used. Sarnat and Sciaky (1965) who also used young rats reported a 60% gained in body weight after 26 days following shortening of the mandibular incisors. Similarly, another experiment which used young rats, which were fed a standard laboratory diet, and kept under similar experimental conditions had a 44% weight gain over a four week period (Weinreb et al 1967). However, the magnitude of the elevation in body weight was much less than the current experimental group. Possibly, having only one mandibular incisor

in occlusion with two maxillary incisors slightly reduces the efficacy of mastication; thus, ultimately influencing the body weight.

The age of the rats certainly affected the length of the impeded mandibular incisors because the rats were still in a phase of active growth. The length of the clinical crown of the left incisors increased by 12.1% and 8.8% in the experimental and control groups respectively. In Weinreb's study, the length of maxillary and mandibular incisors of young rats increased by 22% and 27% respectively, after four weeks (Weinreb et al 1967). By contrast, when combining the data from Burn-Murdoch's studies which involved adult rats in the experiments there was no significant change in the mandibular incisors in the control group after 20 days (Burn-Murdoch 1995, Burn-Murdoch 1999).

In addition, the actual age of a rat may also be related to the eruption rates of the incisors; however, no general agreement could be established. An old study revealed that there was a slight increase in the unimpeded eruption rate with age; 1.84mm, 1.86mm and 1.91mm every 2 days in young, adult and old rats respectively; however, no clear classification of age groups was described in that paper (Bryer 1957). By contrast, a decrease in eruption rate with increasing age, between 5 and 17 weeks, was reported by Hwang and Tonna (1965). However, Lavelle (1968) who studied the unimpeded eruption rates of incisors in rats at different ages did not identify any evidence of changes in the rate of eruption (Lavelle 1968, Lavelle 1969, Matena et al 1974). The current

study did not identify any age effect on either unimpeded and impeded eruption rates owing to the relatively short experimental period. However, large variations of eruption rates in impeded incisors in the experimental group were detected which also generally declined over the whole experimental period.

Conclusions

1. In the experimental group, the mean eruption rate of unimpeded mandibular incisors was 1.03±0.11mm/day, while the impeded incisors erupted at the rate of 0.59±0.12mm/day. In addition, the mean attrition rate of impeded incisors was 0.58±0.16mm/day.

2. An inverse relationship existed between the eruption rate and changes in length of the clinical crown of impeded mandibular incisors.

3. No correlation was established between the rate of eruption of unimpeded mandibular incisors and the length difference between impeded and unimpeded mandibular rats' incisors provided the length difference was greater than 0.5mm after accelerated eruption.

4. An individual control group should be used in studies that seek to compare unimpeded eruption rates to impeded eruption rates.

5. Image analysis was a reliable yet simple method to measure the eruption rate of mandibular incisors in rats.

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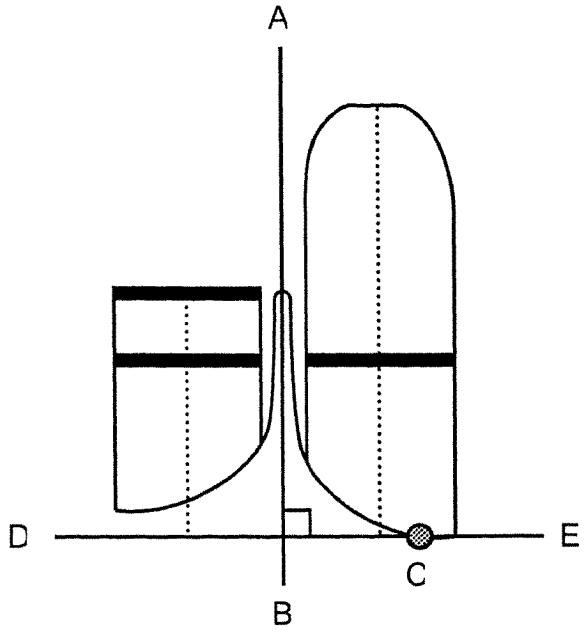

Figure 1. Diagrammatic illustration of the reference points for the measurements.

Reference point (C): the most caudal point of the givgival margin of the left mandibular incisor.

A vertical solid line (AB) bisects the interdental space between the left and right incisors.

Another solid line (DE) passes through the reference point and perpendicular to the vertical line, which acts as a reference plane for measurements of the crown length.

The dotted lines represent the measured lengths of the crowns.

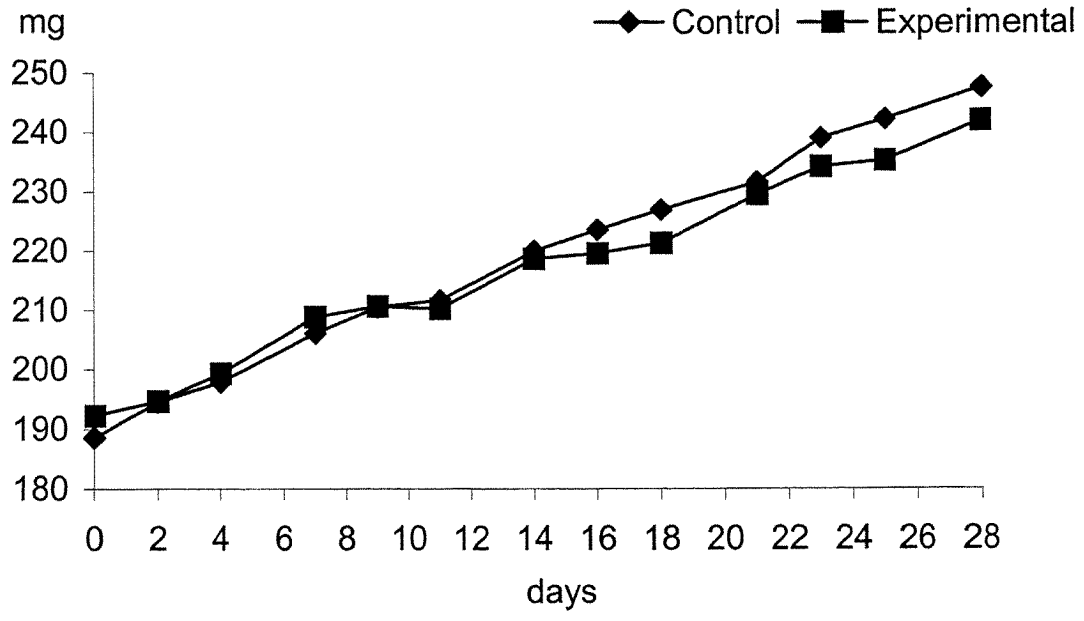

Figure 2. The body weight of the rats in the control and experimental groups during the study period.

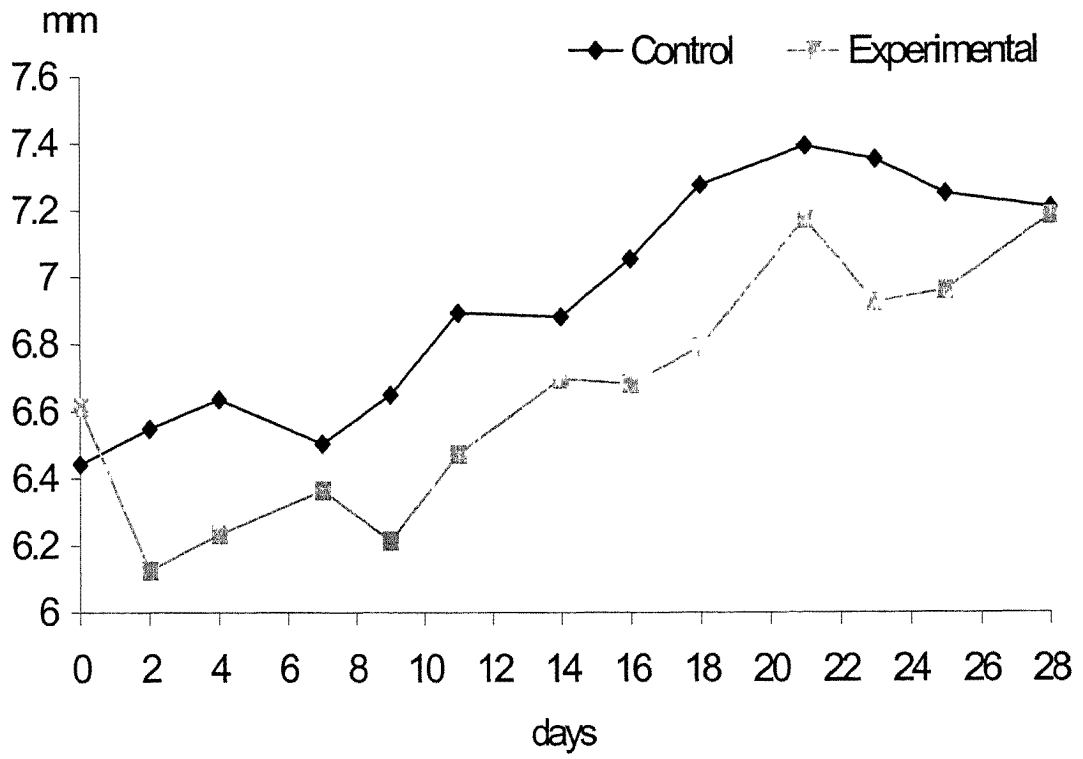

Figure 3. The tooth length of the mandibular left incisors in the experimental and control groups.

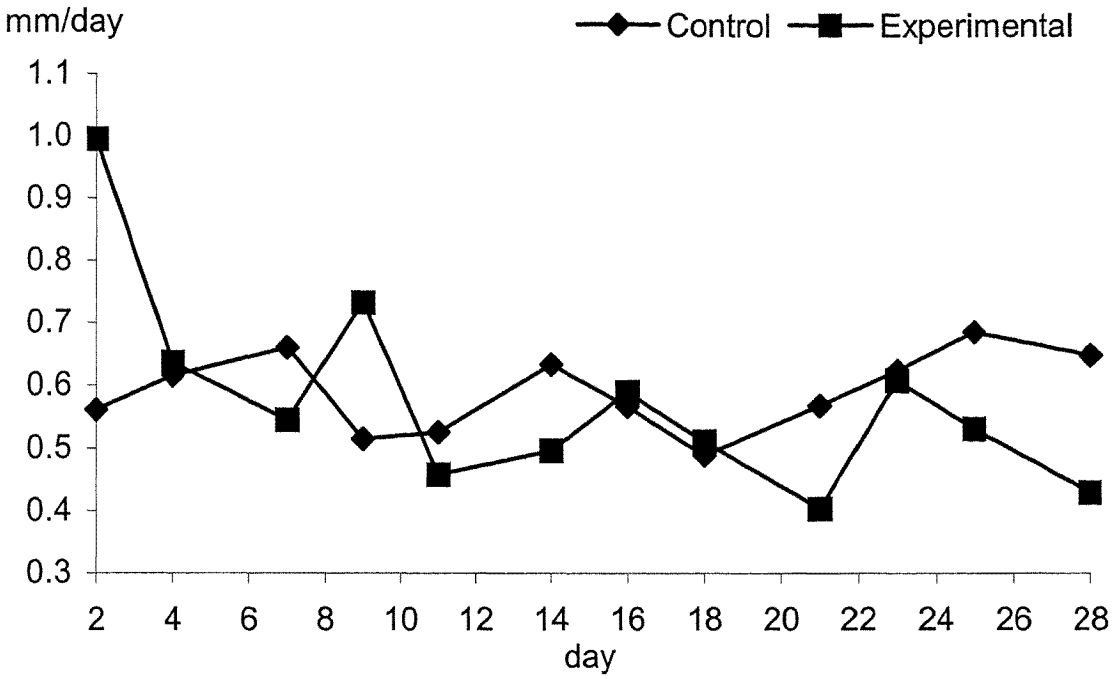

Figure 4. The attrition rates of the left mandibular incisors in the experimental and control groups.

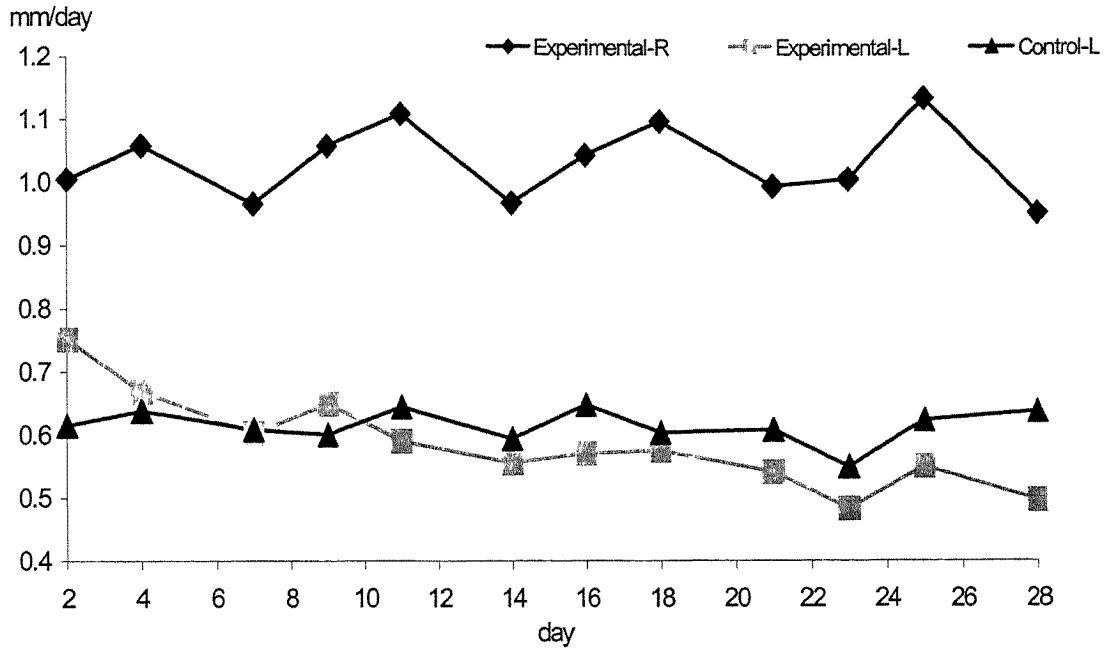

Figure 5. The eruption rates of the mandibular incisors in the experimental group and the left incisors in the control group.

Appendix one

List of tables

Time periods	Eruption rate (mm/day)				p-values
	left		right		
	Mean	S.D.	Mean	S.D.	
Day 0-2	0.61	0.11	0.65	0.10	0 3885
Day 2-4	0.64	0.12	0.52	0.06	0.0198
Day 4-7	0.61	0.08	0.62	0.06	0 4356
Day 7-9	0.60	0.10	0.59	0.08	0.6275
Day 9-11	0.65	0.14	0.67	0.10	0.5961
Day 11-14	0.60	0.10	0.56	0.06	0.1447
Day 14-16	0.65	0.10	0.60	0.10	0.0866
Day 16-18	0.60	0.09	0.66	0.09	0.1440
Day 18-21	0.61	0.06	0.55	0.06	0.0355
Day 21-23	0.55	0.13	0.57	0.05	0.5328
Day 23-25	0.63	0.04	0.62	0.11	0.6407
Day 25-28	0.64	0.10	0.61	0.04	0.4884

Table 1. The comparisons of the eruption rates of the mandibular incisors in the control group.

Time periods	Eruption rate (mm/day)				p-values
	left		right		
	Mean	S.D.	Mean	S.D.	
Day 0-2	0.75	0.11	1.00	0.16	<0.0001
Day 2-4	0.67	0.11	1.06	0.14	<0.0001
Day 4-7	0.60	0.13	0.97	0.08	<0.0001
Day 7-9	0.65	0.12	1.06	0.13	<0.0001
Day 9-11	0.59	0.09	1.11	0.07	<0.0001
Day 11-14	0.56	0.06	0.97	0.09	<0.0001
Day 14-16	0.57	0.09	1.05	0.06	<0.0001
Day 16-18	0.58	0.12	1.10	0.10	<0.0001
Day 18-21	0.54	0.06	1.00	0.08	<0.0001
Day 21-23	0.48	0.11	1.01	0.09	<0.0001
Day 23-25	0.55	0.09	1.14	0.11	<0.0001
Day 25-28	0.50	0.09	0.96	0.06	<0.0001

Table 2. The comparisons of the eruption rates of the mandibular incisors in the experimental group.

Time periods	Eruption rate (mm/day)				p-values
	Experimental		Control		
	Mean	S.D.	Mean	S.D.	
Day 0-2	0.75	0.11	0.61	0.11	0.0066
Day 2-4	0.67	0.11	0.64	0.12	0.5309
Day 4-7	0.60	0.13	0.61	0.08	0.9016
Day 7-9	0.65	0.12	0.6	0.10	0.3060
Day 9-11	0.59	0.09	0.65	0.14	0.2876
Day 11-14	0.56	0.06	0.6	0.10	0.2956
Day 14-16	0.57	0.09	0.65	0.10	0.0736
Day 16-18	0.58	0.12	0.6	0.09	0.5152
Day 18-21	0.54	0.06	0.61	0.06	0.0163
Day 21-23	0.48	0.11	0.55	0.13	0.2735
Day 23-25	0.55	0.09	0.63	0.04	0.0765
Day 25-28	0.50	0.09	0.64	0.10	0.0077

Table 3. The comparisons of the eruption rates of the left mandibular incisors (impeded) in the experimental and control groups.

Time period	Tooth length (mm)				p-values
	Experimental		Control		
	Mean	S.D.	Mean	S.D.	
Day 0	6.61	0.27	6.44	0.42	0.2677
Day 2	6.13	0.29	6.55	0.45	0.0155
Day 4	6.23	0.42	6.64	0.37	0.0235
Day 7	6.37	0.49	6.51	0.48	0.5012
Day 9	6.22	0.43	6.65	0.55	0.0469
Day 11	6.48	0.31	6.90	0.41	0.0111
Day 14	6.70	0.39	6.89	0.34	0.2356
Day 16	6.69	0.39	7.06	0.40	0.0340
Day 18	6.80	0.40	7.29	0.44	0.0117
Day 21	7.18	0.40	7.40	0.51	0.2621
Day 23	6.93	0.43	7.36	0.52	0.0878
Day 25	6.97	0.53	7.26	0.51	0.2869
Day 28	7.19	0.52	7.22	0.58	0.9335

Table 4. The comparisons of the tooth length of the left mandibular incisors (impeded) in the experimental and control groups.

Time period	Body weight (mg)				p-values
	Experimental		Control		
	Mean	S.D.	Mean	S.D.	
Day 0	192.30	7.82	188.59	4.21	0.1664
Day 2	194.67	7.35	194.58	4.32	0.9717
Day 4	199.36	10.06	197.93	4.65	0.6614
Day 7	208.95	8.33	206.18	5.18	0.3461
Day 9	210.79	10.84	210.65	5.48	0.9686
Day 11	210.40	7.68	211.84	8.16	0.6679
Day 14	218.94	7.96	220.27	6.18	0.6574
Day 16	219.91	8.04	223.88	6.43	0.2028
Day 18	221.64	9.79	227.32	8.54	0.1521
Day 21	229.91	6.90	232.01	9.09	0.5425
Day 23	234.65	10.06	239.48	8.22	0.3316
Day 25	235.73	8.33	242.70	10.17	0.1470
Day 28	242.44	10.62	248.05	9.21	0.2940

Table 5. The comparisons of the body weight of the rats in the experimental and control groups.

Time period	Attrition rate (mm/day)				p-values
	Left		Right		
	Mean	S.D.	Mean	S.D.	
Day 0-2	0.56	0.16	0.60	0.11	0.5343
Day 2-4	0.62	0.16	0.60	0.15	0.7504
Day 4-7	0.66	0.12	0.62	0.12	0.3773
Day 7-9	0.52	0.19	0.55	0.26	0.6933
Day 9-11	0.53	0.22	0.50	0.23	0.7379
Day 11-14	0.64	0.13	0.60	0.08	0.4332
Day 14-16	0.57	0.15	0.54	0.16	0.6225
Day 16-18	0.49	0.19	0.49	0.18	0.9633
Day 18-21	0.57	0.13	0.51	0.13	0.2771
Day 21-23	0.63	0.15	0.65	0.11	0.7861
Day 23-25	0.69	0.23	0.62	0.16	0.5398
Day 25-28	0.65	0.17	0.59	0.08	0.4085

Table 6. The comparisons of the attrition rates of the mandibular incisors in the control group.

Time period	Attrition rate (mm/day)				p-values
	Experimental		Control		
	Mean	S.D.	Mean	S.D.	
Day 0-2	1.00	0.12	0.56	0.16	<0.0001
Day 2-4	0.64	0.11	0.62	0.16	0.7239
Day 4-7	0.55	0.14	0.66	0.12	0.0436
Day 7-9	0.73	0.09	0.52	0.19	0.0023
Day 9-11	0.46	0.12	0.53	0.22	0.3731
Day 11-14	0.50	0.08	0.64	0.13	0.0058
Day 14-16	0.59	0.18	0.57	0.15	0.7429
Day 16-18	0.51	0.11	0.49	0.19	0.7411
Day 18-21	0.40	0.07	0.57	0.13	0.0015
Day 21-23	0.61	0.14	0.63	0.15	0.8272
Day 23-25	0.53	0.15	0.69	0.23	0.1109
Day 25-28	0.43	0.12	0.65	0.17	0.0059

Table 7. The comparisons of the attrition rates of the mandibular left incisors (impeded) in the experimental and control groups.

Time period	Amount of attrition (mm)				p-values
	Left		Right		
	Mean	S.D.	Mean	S.D.	
Day 0-2	1.12	0.31	1.19	0.21	0.5343
Day 2-4	1.23	0.31	1.19	0.30	0.7504
Day 4-7	1.98	0.36	1.85	0.37	0.3773
Day 7-9	1.03	0.38	1.11	0.52	0.6933
Day 9-11	1.05	0.44	0.99	0.47	0.7379
Day 11-14	1.91	0.38	1.80	0.23	0.4332
Day 14-16	1.14	0.30	1.07	0.32	0.6225
Day 16-18	0.98	0.38	0.99	0.36	0.9633
Day 18-21	1.71	0.40	1.53	0.39	0.2771
Day 21-23	1.25	0.31	1.30	0.23	0.7861
Day 23-25	1.38	0.47	1.23	0.31	0.5398
Day 25-28	1.95	0.50	1.76	0.23	0.4085

Table 8. The comparisons of the amount of attrition of the mandibular incisors in the control group.

Time period	Amount of attrition (mm)				p-values
	Experimental		Control		
	Mean	S.D.	Mean	S.D.	
Day 0-2	1.99	0.25	1.12	0.31	<0.0001
Day 2-4	1.27	0.22	1.23	0.31	0.7239
Day 4-7	1.64	0.41	1.98	0.36	0.0436
Day 7-9	1.47	0.18	1.03	0.38	0.0023
Day 9-11	0.92	0.24	1.05	0.44	0.3731
Day 11-14	1.49	0.24	1.91	0.38	0.0058
Day 14-16	1.18	0.36	1.14	0.30	0.7429
Day 16-18	1.02	0.22	0.98	0.38	0.7411
Day 18-21	1.21	0.22	1.71	0.40	0.0015
Day 21-23	1.22	0.27	1.25	0.31	0.8272
Day 23-25	1.07	0.29	1.38	0.47	0.1109
Day 25-28	1.29	0.35	1.95	0.50	0.0059

Table 9. The comparisons of the mean amount of attrition of the mandibular left incisors (impeded) in the experimental and control groups.

Length difference (mm)			Eruption rate (mm/day)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0	3.35	0.30	Day 0-2	0.75	0.11	-0.1513	0.6571
Day 2	2.82	0.31	Day 2-4	0.67	0.11	0.0212	0.9506
Day 4	2.77	0.31	Day 4-7	0.60	0.13	-0.1725	0.6121
Day 7	2.87	0.36	Day 7-9	0.65	0.12	-0.2382	0.4806
Day 9	2.47	0.25	Day 9-11	0.59	0.09	-0.2022	0.5509
Day 11	2.95	0.22	Day 11-14	0.56	0.06	0.8668	0.0006
Day 14	2.87	0.35	Day 14-16	0.57	0.09	-0.0388	0.9099
Day 16	2.91	0.37	Day 16-18	0.58	0.12	0.1320	0.6989
Day 18	2.99	0.29	Day 18-21	0.54	0.06	0.2688	0.4241
Day 21	3.20	0.21	Day 21-23	0.48	0.11	-0.1670	0.6235
Day 23	3.03	0.33	Day 23-25	0.55	0.09	0.2413	0.4747
Day 25	2.80	0.37	Day 25-28	0.50	0.09	-0.3607	0.2758

Table 10. The correlation between the length difference of the left and right mandibular incisors and the eruption rate of the mandibular left incisors (impeded) in the experimental group, immediately after shortening.

Length difference (mm)			Eruption rate (mm/day)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0	3.35	0.30	Day 0-2	1.00	0.16	0.1276	0.7085
Day 2	2.82	0.31	Day 2-4	1.06	0.14	0.0251	0.9418
Day 4	2.77	0.31	Day 4-7	0.97	0.08	0.2379	0.4811
Day 7	2.87	0.36	Day 7-9	1.06	0.13	0.3679	0.2656
Day 9	2.47	0.25	Day 9-11	1.11	0.07	-0.1243	0.7158
Day 11	2.95	0.22	Day 11-14	0.97	0.09	0.8651	0.0006
Day 14	2.87	0.35	Day 14-16	1.05	0.06	0.4466	0.1685
Day 16	2.91	0.37	Day 16-18	1.10	0.10	0.2353	0.4862
Day 18	2.99	0.29	Day 18-21	1.00	0.08	0.8085	0.0026
Day 21	3.20	0.21	Day 21-23	1.01	0.09	-0.4027	0.2195
Day 23	3.03	0.33	Day 23-25	1.14	0.11	0.1328	0.6970
Day 25	2.80	0.37	Day 25-28	0.96	0.06	0.3517	0.2889

Table 11. The correlation between the length difference of the left and right mandibular incisors and the eruption rate of the mandibular right incisors (unimpeded) in the experimental group, immediately after shortening.

Length difference (mm)			Eruption rate (mm/day)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 2	0.79	0.33	Day 0-2	0.75	0.11	-0.4761	0.1388
Day 4	0.77	0.23	Day 2-4	0.67	0.11	0.2686	0.4246
Day 7	0.11	0.26	Day 4-7	0.60	0.13	-0.2972	0.3747
Day 9	0.66	0.20	Day 7-9	0.65	0.12	-0.3478	0.2946
Day 11	0.50	0.19	Day 9-11	0.59	0.09	0.0375	0.9130
Day 14	0.27	0.20	Day 11-14	0.56	0.06	0.6785	0.0217
Day 16	0.74	0.22	Day 14-16	0.57	0.09	-0.2407	0.4759
Day 18	0.84	0.26	Day 16-18	0.58	0.12	0.1835	0.5891
Day 21	0.45	0.11	Day 18-21	0.54	0.06	0.1749	0.6071
Day 23	0.96	0.29	Day 21-23	0.48	0.11	-0.4161	0.2030
Day 25	0.81	0.35	Day 23-25	0.55	0.09	0.2547	0.4497
Day 28	0.21	0.25	Day 25-28	0.50	0.09	-0.2103	0.5348

Table 12. The correlation between the length difference of the left and right mandibular incisors and the eruption rate of the mandibular left incisors (impeded) in the experimental group, after accelerated eruption.

Length difference (mm)			Eruption rate (mm/day)			Correlation coefficient (r)	p-values
Period	Mean	S.D.	Period	Mean	S.D.		
Day 2	0.79	0.33	Day 0-2	1.00	0.16	-0.2300	0.4963
Day 4	0.77	0.23	Day 2-4	1.06	0.14	0.1975	0.5605
Day 7	0.11	0.26	Day 4-7	0.97	0.08	0.0777	0.8226
Day 9	0.66	0.20	Day 7-9	1.06	0.13	-0.0475	0.8898
Day 11	0.50	0.19	Day 9-11	1.11	0.07	0.2473	0.4634
Day 14	0.27	0.20	Day 11-14	0.97	0.09	0.5761	0.0636
Day 16	0.74	0.22	Day 14-16	1.05	0.06	-0.1645	0.6288
Day 18	0.84	0.26	Day 16-18	1.10	0.10	0.2083	0.5389
Day 21	0.45	0.11	Day 18-21	1.00	0.08	0.0638	0.8523
Day 23	0.96	0.29	Day 21-23	1.01	0.09	-0.7342	0.0101
Day 25	0.81	0.35	Day 23-25	1.14	0.11	0.1204	0.7244
Day 28	0.21	0.25	Day 25-28	0.96	0.06	-0.0434	0.8992

Table 13. The correlation between the length difference of the left and right mandibular incisors and the eruption rate of the mandibular right incisors (unimpeded) in the experimental group, after accelerated eruption.

Length difference (mm)			Eruption rate (mm/day)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0	3.35	0.30	Day 0-2	0.88	0.13	0.0167	0.9611
Day 2	2.82	0.31	Day 2-4	0.86	0.12	0.0247	0.9426
Day 4	2.77	0.31	Day 4-7	0.78	0.10	-0.0104	0.9758
Day 7	2.87	0.36	Day 7-9	0.85	0.11	0.0896	0.7933
Day 9	2.47	0.25	Day 9-11	0.85	0.07	-0.1918	0.5722
Day 11	2.95	0.22	Day 11-14	0.76	0.07	0.8960	0.0002
Day 14	2.87	0.35	Day 14-16	0.81	0.06	0.2192	0.5173
Day 16	2.91	0.37	Day 16-18	0.84	0.10	0.1940	0.5675
Day 18	2.99	0.29	Day 18-21	0.77	0.06	0.6504	0.0303
Day 21	3.20	0.21	Day 21-23	0.75	0.09	-0.3005	0.3692
Day 23	3.03	0.33	Day 23-25	0.84	0.09	0.1956	0.5644
Day 25	2.80	0.37	Day 25-28	0.73	0.07	-0.0658	0.8475

Table 14. The correlation between the length difference of left and right mandibular incisors and the mean eruption rate of mandibular right (unimpeded) and left (impeded) incisors in the experimental group, immediately after cutting.

Length change (mm)			Eruption rate (mm/day)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0-2	-0.49	0.17	Day 0-2	0.75	0.11	0.4289	0.1881
Day 2-4	0.11	0.24	Day 2-4	0.67	0.11	0.6074	0.0475
Day 4-7	0.13	0.32	Day 4-7	0.60	0.13	0.4354	0.1807
Day 7-9	-0.15	0.26	Day 7-9	0.65	0.12	0.7084	0.0147
Day 9-11	0.26	0.27	Day 9-11	0.59	0.09	0.5028	0.1149
Day 11-14	0.23	0.20	Day 11-14	0.56	0.06	0.6327	0.0367
Day 14-16	-0.01	0.34	Day 14-16	0.57	0.09	0.0010	0.9977
Day 16-18	0.11	0.25	Day 16-18	0.58	0.12	0.5870	0.0576
Day 18-21	0.38	0.24	Day 18-21	0.54	0.06	0.5192	0.1017
Day 21-23	-0.25	0.16	Day 21-23	0.48	0.11	0.0304	0.9293
Day 23-25	0.04	0.36	Day 23-25	0.55	0.09	0.4475	0.1676
Day 25-28	0.22	0.37	Day 25-28	0.50	0.09	0.5057	0.1125

Table 15. The correlation between the eruption rates and the length change on consecutive days for the left incisors (impeded) in the experimental group.

Tooth length (mm)			Length change (mm)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0	6.61	0.27	Day 0-2	-0.49	0.17	-0.1888	0.5782
Day 2	6.13	0.29	Day 2-4	0.11	0.24	0.2263	0.5034
Day 4	6.23	0.42	Day 4-7	0.13	0.32	-0.1352	0.6918
Day 7	6.37	0.49	Day 7-9	-0.15	0.26	-0.4947	0.1219
Day 9	6.22	0.43	Day 9-11	0.26	0.27	-0.7035	0.0157
Day 11	6.48	0.31	Day 11-14	0.23	0.20	0.1180	0.7297
Day 14	6.70	0.39	Day 14-16	-0.01	0.34	-0.4387	0.1771
Day 16	6.69	0.39	Day 16-18	0.11	0.25	-0.2732	0.4164
Day 18	6.80	0.40	Day 18-21	0.38	0.24	-0.3231	0.3325
Day 21	7.18	0.40	Day 21-23	-0.25	0.16	0.0428	0.9006
Day 23	6.93	0.43	Day 23-25	0.04	0.36	-0.1196	0.7261
Day 25	6.97	0.53	Day 25-28	0.22	0.37	-0.3829	0.2451

Table 16. The correlation between the tooth length and the length change on consecutive days for the impeded incisors in the experimental group.

Eruption rate (mm/day)			Occlusal clearance (mm)			Correlation	p-values
Period	Mean	S.D.	Period	Mean	S.D.	coefficient (r)	
Day 0-2	1.00	0.16	Day 0-2	2.07	0.29	-0.0642	0.8512
Day 2-4	1.06	0.14	Day 2-4	1.79	0.26	0.1015	0.7664
Day 4-7	0.97	0.08	Day 4-7	1.44	0.25	0.1851	0.5859
Day 7-9	1.06	0.13	Day 7-9	1.76	0.26	0.2353	0.4860
Day 9-11	1.11	0.07	Day 9-11	1.48	0.20	0.0377	0.9124
Day 11-14	0.97	0.09	Day 11-14	1.61	0.19	0.8164	0.0022
Day 14-16	1.05	0.06	Day 14-16	1.80	0.24	0.2560	0.4474
Day 16-18	1.10	0.10	Day 16-18	1.87	0.31	0.3691	0.2939
Day 18-21	1.00	0.08	Day 18-21	1.72	0.16	0.7563	0.0071
Day 21-23	1.01	0.09	Day 21-23	2.08	0.23	-0.6466	0.0316
Day 23-25	1.14	0.11	Day 23-25	1.92	0.32	0.1366	0.6887
Day 25-28	0.96	0.06	Day 25-28	1.51	0.25	0.2403	0.4767

Table 17. The correlation between the mean occlusal clearance on consecutive days and unimpeded eruption rates in the experimental group.

Appendix 2

DATE 11/20/00 (MM/DD/YY)

			right incisor									left incisor								
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D C)	attrition (DD-CC)-(D-C)	attrition rate [(DD CC)-(D C)]/day	eruption in length (C-CC)	eruption rate ([C CC)]/day)	rate of length change (D-DD)/day
Group B 1	0	old mark		6 54	6 54	–								6 71	6 71					
		new mark	2 09	3 36	1 26	3 12	–	–	–	–	–	–	1 90	6 47	4 58	–	–	–	–	–
Group B 1	L	old mark		6 09	6 09	–								6 12	6 12					
		new mark	1 79	3 25	1 46	2 79	–	–	–	–	–	–	1 68	6 04	4 36	–	–	–	–	–
Group B 1	R	old mark		6 41	6 41	–								6 24	6 24					
		new mark	1 74	3 01	1 27	3 56	–	–	–	–	–	–	1 97	6 57	4 60	–	–	–	–	–
Group B 2	0	old mark		6 33	6 33	–								6 43	6 43					
		new mark	1 55	3 33	1 78	3 11	–	–	–	–	–	–	1 35	6 45	5 09	–	–	–	–	–
Group B 2	L	old mark		6 91	6 91	–								6 81	6 81					
		new mark	2 40	3 38	0 98	3 59	–	–	–	–	–	–	2 47	6 97	4 50	–	–	–	–	–
Group B 2	R	old mark		6 68	6 68	–								6 65	6 65					
		new mark	1 22	3 40	2 18	3 23	–	–	–	–	–	–	1 10	6 63	5 53	–	–	–	–	–
Group B 3	0	old mark		7 09	7 09	–								7 11	7 11					
		new mark	1 79	3 47	1 68	3 60	–	–	–	–	–	–	1 73	7 07	5 34	–	–	–	–	–
Group B 3	L	old mark		6 61	6 61	–								6 62	6 62					
		new mark	1 48	3 34	1 86	3 35	–	–	–	–	–	–	1 45	6 69	5 24	–	–	–	–	–
Group B 3	R	old mark		6 84	6 84	–								6 68	6 68					
		new mark	1 74	2 86	1 11	3 88	–	–	–	–	–	–	1 66	6 73	5 08	–	–	–	–	–
Group B 4	0	old mark		7 00	7 00	–								6 78	6 78					
		new mark	1 59	3 31	1 72	3 44	–	–	–	–	–	–	1 49	6 75	5 26	–	–	–	–	–
Group B 4	L	old mark		6 54	6 54	–								6 59	6 59					
		new mark	0 39	3 18	2 79	3 20	–	–	–	–	–	–	0 24	6 38	6 14	–	–	–	–	–
Mean						3 350														
SD						0 302														

DATE 11/22/00 (MM/DD/YY) **DAY** 2

		right incisor										left incisor							
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)	rate of length change (D-DD)/day
Group B 1 0	old mark	3.79	5.26	1.47	–	-0.21	-0.10	1.69	1.90	0.85	0.95	3.08	6.10	3.02	1.56	0.78	1.19	0.59	-0.19
	new mark	2.12	3.48	1.36	2.56	–	–	–	–	–	–	2.19	6.04	3.85	–	–	–	–	–
Group B 1 L	old mark	3.78	5.09	1.31	–	0.15	0.07	1.99	1.84	1.00	0.92	3.30	5.77	2.47	1.89	0.94	1.62	0.81	-0.14
	new mark	2.06	3.26	1.20	2.58	–	–	–	–	–	–	1.57	5.84	4.26	–	–	–	–	–
Group B 1 R	old mark	4.01	5.21	1.20	–	0.06	0.03	2.27	2.20	1.13	1.10	3.55	5.76	2 21	2.39	1.19	1.58	0.79	-0.41
	new mark	2.23	3.21	0.98	2.63	–	–	–	–	–	–	2.28	5.84	3.57	–	–	–	–	–
Group B 2 0	old mark	3.18	5.45	2.27	–	-0.49	-0.25	1.62	2.12	0.81	1.06	2.78	5.75	2.97	2.12	1.06	1.42	0.71	-0.35
	new mark	2.52	3.48	0.96	2.60	–	–	–	–	–	–	2.65	6.08	3.43	–	–	–	–	–
Group B 2 L	old mark	4.34	5.43	1.09	–	-0.11	-0.06	1.94	2.05	0.97	1.03	3.76	6.49	2.73	1.76	0.88	1.29	0.65	-0.24
	new mark	2.23	3.42	1.18	3.04	–	–	–	–	–	–	2.23	6.45	4.22	–	–	–	–	–
Group B 2 R	old mark	3.28	5.36	2.08	–	0.10	0.05	2.06	1.96	1.03	0.98	2.54	6.08	3.54	1.98	0.99	1.44	0.72	-0.27
	new mark	2.38	3.71	1.33	2.39	–	–	–	–	–	–	2.41	6.10	3.69	–	–	–	–	–
Group B 3 0	old mark	3.62	5.35	1.73	–	-0.05	-0.02	1 83	1.88	0.92	0.94	3.10	6.54	3.44	1.90	0.95	1.38	0.69	-0.26
	new mark	2.43	3.30	0.88	3.43	–	–	–	–	–	–	2.19	6.74	4.55	–	–	–	–	–
Group B 3 L	old mark	3.67	5.53	1.86	–	0.00	0.00	2.19	2.19	1.10	1.10	3.21	6.10	2.89	2.35	1.18	1.76	0.88	-0.29
	new mark	1.90	3.05	1.15	2.97	–	–	–	–	–	–	1.95	6.02	4.07	–	–	–	–	–
Group B 3 R	old mark	3.94	5.09	1.16	–	-0.05	-0.02	2.19	2.24	1.10	1.12	3.17	6.43	3.26	1.82	0.91	1.51	0.76	-0.15
	new mark	1.71	3.13	1.42	3.13	–	–	–	–	–	–	1.97	6.25	4.28	–	–	–	–	–
Group B 4 0	old mark	3.23	5.02	1.79	–	-0.07	-0.04	1.64	1.71	0.82	0.86	2.91	6.05	3.13	2.13	1.06	1.43	0.71	-0.35
	new mark	2.10	3.28	1.18	2.86	–	–	–	–	–	–	2.30	6.14	3.85	–	–	–	–	–
Group B 4 L	old mark	3.07	5.87	2.81	–	-0.02	-0.01	2.67	2.69	1.34	1.35	2.17	6.32	4.15	1.99	0.99	1.93	0.96	-0.03
	new mark	2.54	3.54	1.01	2.82	–	–	–	–	–	–	2.21	6.36	4.15	–	–	–	–	–
Mean					**2.818**		**-0.031**			**1.005**	**1.036**					**0.995**		**0.752**	**-0.243**
SD					**0.306**		**0.087**			**0.158**	**0.133**					**0.124**		**0.105**	**0.110**
Eruption rate increase (1) = (A-AA)/(C-CC)										**133.7%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**137.8%**								

DATE	11/24/00 (MM/DD/YY)			DAY	2															
						right incisor								left incisor						
		gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attrition	attrition rate	eruption in length	eruption rate	rate of length change
		(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC)]/day)	(D-DD)/day
Group B 1 0	old mark	4.40	5.71	1.31	–	0.05	0.02	2.28	2.23	1.14	1.12	3.70	6.51	2.81	1.04	0.52	1.52	0.76	0.24
	new mark	2.59	3.68	1.09	2.81	–	–	–	–	–	–	2.46	6.49	4.03	–	–	–	–	–
Group B 1 L	old mark	4.01	5.03	1.02	–	0.18	0.09	1.95	1.77	0.98	0.89	2.96	5 55	2.59	1.67	0.84	1.39	0.69	-0.14
	new mark	1.81	3.09	1.28	2.46	–	–	–	–	–	–	1.98	5.55	3.57	–	–	–	–	–
Group B 1 R	old mark	4.16	5.18	1.02	–	-0.04	-0.02	1.93	1.97	0.96	0.98	3.59	5.80	2.21	1.36	0 68	1.31	0.66	-0 02
	new mark	2.22	3.36	1.13	2.41	–	–	–	–	–	–	2.11	5.76	3.66	–	–	–	–	–
Group B 2 0	old mark	4.23	5.17	0.94	–	0.03	0.01	1.71	1.69	0.86	0 84	3.44	5.66	2.22	1.21	0.61	0.80	0.40	-0.21
	new mark	2.55	3.42	0.87	2.37	–	–	–	–	–	–	2.42	5.79	3.38	–	–	–	–	–
Group B 2 L	old mark	4.58	5.76	1.18	–	0.01	0.00	2.35	2.34	1.17	1.17	3.72	6.69	2 96	1.26	0.63	1.49	0.75	0.12
	new mark	2.61	3.51	0.89	3.08	–	–	–	–	–	–	2.49	6.58	4.10	–	–	–	–	–
Group B 2 R	old mark	4.73	6.08	1.35	–	-0.02	-0.01	2.35	2.37	1.17	1.18	3.84	6.53	2.69	1.01	0.50	1.43	0.72	0.21
	new mark	2.51	3.77	1.26	2.53	–	–	–	–	–	–	2.62	6.30	3.68	–	–	–	–	–
Group B 3 0	old mark	4.19	5.18	1.00	–	-0.12	-0.06	1.76	1.88	0.88	0.94	3.31	6.36	3.05	1.50	0.75	1.12	0.56	-0.19
	new mark	2.07	3.33	1.26	2.83	–	–	–	–	–	–	1.76	6.16	4.40	–	–	–	–	–
Group B 3 L	old mark	4.05	5.18	1.13	–	0.01	0.01	2.15	2.14	1.08	1.07	3.42	6.08	2 66	1.41	0.71	1.47	0.74	0.03
	new mark	1.98	3.20	1.22	2.83	–	–	–	–	–	–	1.74	6.03	4.29	–	–	–	–	–
Group B 3 R	old mark	4.36	5.84	1.48	–	-0.06	-0.03	2.65	2.71	1.33	1.36	3.51	6.84	3.33	0.95	0.48	1.54	0.77	0.29
	new mark	2.86	3.48	0.61	3.28	–	–	–	–	–	–	2.59	6.76	4.16	–	–	–	–	–
Group B 4 0	old mark	4.16	5.40	1.24	–	-0.06	-0.03	2.06	2.12	1.03	1.06	3.73	6.27	2.54	1.30	0.65	1.43	0.72	0.06
	new mark	1.66	3.20	1.55	3.18	–	–	–	–	–	–	1.76	6.38	4.62	–	–	–	–	–
Group B 4 L	old mark	4.63	5.61	0.98	–	0.03	0.01	2.10	2.07	1.05	1.03	3.42	6.29	2.87	1.28	0.64	1.21	0.61	-0.03
	new mark	2.68	3.57	0.89	2.74	–	–	–	–	–	–	2.74	6.31	3.57	–	–	–	–	–
Mean					**2.774**		**0.000**			**1.058**	**1.058**					**0.636**		**0.669**	**0.033**
SD					**0.311**		**0.039**			**0.139**	**0.147**					**0.109**		**0.111**	**0.172**
Eruption rate increase (1) = (A-AA)/(C-CC)										**158.2%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**158.2%**								

DATE	11/27/00 (MM/DD/YY)		DAY	3															
					right incisor									left incisor					
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)	rate of length change (D-DD)/day
Group B 1 0	old mark	5.24	6.37	1.13	–	-0.04	-0.01	2.65	2.69	0.88	0.90	4.01	6.70	2.70	1.33	0.44	1.54	0.51	0.07
	new mark	1.85	3.43	1.59	3.09	–	–	–	–	–	–	2.00	6.53	4.52	–	–	–	–	–
Group B 1 L	old mark	4.80	5.80	1.00	–	0.28	0.09	3.00	2.71	1.00	0.90	4.35	5.27	0.92	2.66	0.89	2.37	0.79	-0.10
	new mark	2.25	3.20	0.96	2.13	–	–	–	–	–	–	2.32	5.33	3.01	–	–	–	–	–
Group B 1 R	old mark	5.35	6.46	1.11	–	0.03	0.01	3.13	3.10	1.04	1.03	4.32	6.52	2.20	1.45	0.48	2.21	0.74	0.25
	new mark	2.22	3.70	1.48	2.82	–	–	–	–	–	–	2.05	6.51	4.46	–	–	–	–	–
Group B 2 0	old mark	5.09	5.70	0.61	–	0.26	0.09	2.53	2.27	0.84	0.76	3.98	5.61	1.63	1.75	0.58	1.56	0.52	-0.06
	new mark	2.04	3.18	1.13	2.35	–	–	–	–	–	–	1.89	5.52	3.63	–	–	–	–	–
Group B 2 L	old mark	5.61	6.48	0.87	–	0.02	0.01	3.00	2.98	1.00	0.99	4.21	6.87	2.66	1.43	0.48	1.72	0.57	0.10
	new mark	2.41	3.85	1.43	3.01	–	–	–	–	–	–	2.35	6.85	4.50	–	–	–	–	–
Group B 2 R	old mark	5.07	6.37	1.30	–	-0.04	-0.01	2.56	2.60	0.85	0.87	3.98	6.56	2.58	1.10	0.37	1.36	0.45	0.09
	new mark	2.20	3.59	1.39	2.91	–	–	–	–	–	–	2.29	6.50	4.20	–	–	–	–	–
Group B 3 0	old mark	5.35	6.54	1.20	–	0.07	0.02	3.28	3.21	1.09	1.07	4.02	6.81	2.78	1.62	0.54	2.26	0.75	0.21
	new mark	2.55	3.57	1.02	3.35	–	–	–	–	–	–	2.61	6.92	4.30	–	–	–	–	–
Group B 3 L	old mark	5.13	6.33	1.20	–	0.02	0.01	3.15	3.12	1.05	1.04	3.90	6.53	2.64	1.65	0.55	2.15	0.72	0.17
	new mark	1.93	3.52	1.59	3.10	–	–	–	–	–	–	1.83	6.62	4.79	–	–	–	–	–
Group B 3 R	old mark	5.67	6.26	0.59	–	0.03	0.01	2.81	2.78	0.94	0.93	4.09	6.46	2.37	1.79	0.60	1.50	0.50	-0.10
	new mark	2.37	3.83	1.46	2.90	–	–	–	–	–	–	2.00	6.72	4.72	–	–	–	–	–
Group B 4 0	old mark	4.70	6.20	1.50	–	0.05	0.02	3.04	2.99	1.01	1.00	3.67	6.39	2.72	1 90	0 63	1.91	0.64	0.00
	new mark	2.35	3.63	1.28	2.76	–	–	–	–	–	–	2.30	6.39	4.09	–	–	–	–	–
Group B 4 L	old mark	5.44	6.35	0.91	–	-0.02	-0.01	2.76	2.78	0 92	0.93	4.07	6.31	2.24	1.33	0.44	1.32	0.44	0.00
	new mark	2.28	3.17	0.89	3.15	–	–	–	–	–	–	1.98	6.33	4.35	–	–	–	–	–
Mean					**2.869**		**0.020**			**0.966**	**0.947**					**0.546**		**0.603**	**0.058**
SD					**0.357**		**0.037**			**0.084**	**0.091**					**0.137**		**0.128**	**0.120**
Eruption rate increase (1) = (A-AA)/(C-CC)										**160.2%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**156.9%**								

DATE	11/29/00 (MM/DD/YY)		DAY	2														
					right incisor							left incisor						
	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attrition	attrition rate	eruption in length	eruption rate	rate of length change
	(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC)]/day)	(D-DD)/day
Group B 1 0 old mark	4.12	5.57	1.45	–	0.14	0.07	2.28	2.14	1.14	1.07	3.17	6.27	3.10	1.42	0.71	1.16	0.58	-0.13
new mark	2.16	3.77	1.61	2.48	–	–	–	–	–	–	2.10	6.25	4.14	–	–	–	–	–
Group B 1 L old mark	4.03	5.03	1.00	–	-0.04	-0.02	1.79	1.83	0.89	0.91	3.80	5.58	1.78	1.23	0.62	1.48	0.74	0.12
new mark	2.19	3.21	1.02	2.32	–	–	–	–	–	–	1.74	5.53	3.79	–	–	–	–	–
Group B 1 R old mark	3.77	5.23	1.45	–	0.02	0.01	1.56	1.53	0.78	0.77	2.92	5.94	3.02	1.44	0.72	0.87	0.43	-0.29
new mark	1.82	3.63	1.80	2.43	–	–	–	–	–	–	1.91	6.05	4.14	–	–	–	–	–
Group B 2 0 old mark	4.23	5.19	0.95	–	0.18	0.09	2.19	2.01	1.09	1 00	3.32	5.31	2.00	1.63	0.82	1.43	0.71	-0.10
new mark	2.28	3.26	0.98	2.16	–	–	–	–	–	–	2.17	5.42	3.25	–	–	–	–	–
Group B 2 L old mark	4.78	6.01	1.23	–	0.20	0.10	2.36	2.16	1.18	1.08	3.75	6.64	2.89	1.62	0.81	1.40	0.70	-0.11
new mark	2.35	4.02	1.67	2.59	–	–	–	–	–	–	2.30	6.62	4.32	–	–	–	–	–
Group B 2 R old mark	4.29	5.64	1.35	–	0.04	0.02	2.10	2.05	1.05	1.03	3.30	6.43	3.13	1.07	0.54	1.01	0.50	-0.03
new mark	2.06	3.60	1.54	2.87	–	–	–	–	–	–	2.21	6.47	4.27	–	–	–	–	–
Group B 3 0 old mark	4.61	5.64	1.03	–	-0.01	-0.01	2.06	2.07	1.03	1.04	3.75	6.53	2.78	1.53	0.76	1.14	0.57	-0.19
new mark	2.58	4.06	1.48	2.53	–	–	–	–	–	–	2.00	6.58	4.58	–	–	–	–	–
Group B 3 L old mark	4.06	5.69	1.63	–	-0.04	-0.02	2.13	2.17	1.06	1.08	3.26	6.44	3.19	1.60	0.80	1.42	0.71	-0.09
new mark	1.87	3.63	1.76	2.77	–	–	–	–	–	–	2.04	6.40	4.36	–	–	–	–	–
Group B 3 R old mark	4.40	5.64	1.24	–	0.22	0.11	2.03	1.81	1.02	0.91	3.21	6.36	3.14	1.58	0.79	1.21	0.61	-0.18
new mark	2.32	4.06	1.74	2.29	–	–	–	–	–	–	2.32	6.35	4.03	–	–	–	–	–
Group B 4 0 old mark	4.72	5.91	1.19	–	0.09	0.05	2.37	2.27	1.18	1.14	3.88	6.59	2.71	1.38	0.69	1.58	0.79	0.10
new mark	2.02	3.88	1.87	2.65	–	–	–	–	–	–	2.26	6.53	4.27	–	–	–	–	–
Group B 4 L old mark	4.73	5.58	0.84	–	0.05	0.02	2.45	2.40	1.22	1.20	3.58	6.29	2.71	1.63	0.82	1.60	0.80	-0.02
new mark	2.69	4.09	1.40	2.03	–	–	–	–	–	–	2.15	6.12	3.97	–	–	–	–	–
Mean				**2.465**		**0.039**			**1.059**	**1.021**					**0.734**		**0.650**	**-0.084**
SD				**0.255**		**0.047**			**0.132**	**0.121**					**0.091**		**0.119**	**0.122**
Eruption rate increase (1) = (A-AA)/(C-CC)									**163.1%**									
Eruption rate increase (2) = (B-BB)/(C-CC)										**157.1%**								

DATE 12/01/00 (MM/DD/YY) **DAY** 2

		right incisor										left incisor									
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC]/day)	rate of length change (D-DD)/day
Group B 1 0	old mark	4.40	5.91	1.52	–	0.09	0.05	2.24	2.15	1.12	1.07	3.29	6.65	3.36	0.78	0.39	1.19	0.59	0.20
	new mark	2.38	4.22	1.84	2.52	–	–	–	–	–	–	2.24	6.73	4.49	–	–	–	–	–
Group B 1 L	old mark	4.57	5.66	1.09	–	-0.07	-0.03	2.37	2.44	1.19	1.22	3.18	6.08	2.90	0.89	0.45	1.44	0.72	0.28
	new mark	2.29	3.01	0.72	2.93	–	–	–	–	–	–	2.09	5.94	3.86	–	–	–	–	–
Group B 1 R	old mark	4.00	5.81	1.81	–	0.00	0.00	2.18	2.18	1.09	1.09	3.25	6.18	2.93	1.21	0.60	1.34	0.67	0.06
	new mark	2.00	3.49	1.50	2.73	–	–	–	–	–	–	2.02	6.22	4.20	–	–	–	–	–
Group B 2 0	old mark	4.51	5.45	0.93	–	0.05	0.02	2.24	2.19	1.12	1.09	3.27	5.94	2.67	0.59	0.29	1.10	0.55	0.26
	new mark	2.30	3.05	0.75	2.85	–	–	–	–	–	–	2.41	5.90	3.49	–	–	–	–	–
Group B 2 L	old mark	4.30	6.04	1.74	–	-0.07	-0.04	1.94	2.02	0.97	1.01	3.17	6.40	3.23	1.09	0.55	0.87	0.44	-0.11
	new mark	2.38	3.49	1.11	2.96	–	–	–	–	–	–	2.30	6.45	4.15	–	–	–	–	–
Group B 2 R	old mark	4.37	5.98	1.61	–	-0.07	-0.03	2.31	2.38	1.16	1.19	3.14	6.72	3.58	0.69	0.34	0.94	0.47	0.13
	new mark	2.61	3.88	1.27	2.83	–	–	–	–	–	–	2.18	6.71	4.53	–	–	–	–	–
Group B 3 0	old mark	4.69	6.17	1.47	–	0.00	0.00	2.11	2.11	1.06	1.06	3.16	6.43	3.27	1.31	0.66	1.16	0.58	-0.08
	new mark	2.55	3.55	0.99	2.90	–	–	–	–	–	–	2.16	6.45	4.29	–	–	–	–	–
Group B 3 L	old mark	4.22	5.99	1.77	–	-0.01	0.00	2.35	2.36	1.18	1.18	3.30	6.63	3.33	1.03	0.52	1.26	0.63	0.11
	new mark	2.33	3.40	1.07	3.32	–	–	–	–	–	–	2.14	6.72	4.58	–	–	–	–	–
Group B 3 R	old mark	4.73	6.48	1.76	–	-0.02	-0.01	2.40	2.42	1.20	1.21	3.71	6.94	3.23	0.80	0.40	1.39	0.69	0.29
	new mark	2.14	3.72	1.58	3.15	–	–	–	–	–	–	1.79	6.87	5.08	–	–	–	–	–
Group B 4 0	old mark	4.11	6.02	1.91	–	-0.04	-0.02	2.09	2.13	1.05	1.07	3.53	6.75	3.22	1.05	0.52	1.27	0.64	0.11
	new mark	2.32	3.65	1.33	3.11	–	–	–	–	–	–	2.08	6.77	4.69	–	–	–	–	–
Group B 4 L	old mark	4.91	6.28	1.37	–	0.02	0.01	2.22	2.19	1.11	1.10	3.19	6.52	3.33	0.64	0.32	1.04	0.52	0.20
	new mark	2.73	3.42	0.69	3.11	–	–	–	–	–	–	2.27	6.54	4.27	–	–	–	–	–
Mean					**2.946**		**-0.005**			**1.112**	**1.117**					**0.459**		**0.591**	**0.132**
SD					**0.222**		**0.026**			**0.069**	**0.072**					**0.120**		**0.091**	**0.134**
Eruption rate increase (1) = (A-AA)/(C-CC)										**188.1%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**189.0%**								

DATE		12/04/00	(MM/DD/YY)		DAY	3															
			right incisor										left incisor								
			gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attrition	attrition rate	eruption in length	eruption rate	rate of length change
			(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC)]/day)	(D-DD)/day
Group B 1	0	old mark	4.72	6.58	1.85	–	-0.02	-0.01	2.35	2.36	0.78	0.79	3.57	6.55	2.98	1.65	0.55	1.33	0.44	-0.06
		new mark	2.16	4.38	2.22	2.32	–	–	–	–	–	–	2.10	6.69	4.60	–	–	–	–	–
Group B 1	L	old mark	5.20	5.82	0.61	–	0.11	0.04	2.91	2.80	0.97	0.93	3.79	6.25	2.46	1.75	0.58	1.70	0.57	0.10
		new mark	1.59	3.22	1.63	3.02	–	–	–	–	–	–	1.68	6.25	4.57	–	–	–	–	–
Group B 1	R	old mark	4.84	6.22	1.38	–	0.12	0.04	2.85	2.73	0.95	0.91	3.70	6.60	2.89	1.42	0.47	1.68	0.56	0.12
		new mark	1.98	3.73	1.75	2.86	–	–	–	–	–	–	2.16	6.59	4.44	–	–	–	–	–
Group B 2	0	old mark	4.98	5.90	0.92	–	-0.16	-0.05	2.69	2.85	0.90	0.95	3.85	5.84	2.00	1.73	0.58	1.44	0.48	-0.02
		new mark	2.03	3.72	1.69	2.13	–	–	–	–	–	–	2.20	5.85	3.65	–	–	–	–	–
Group B 2	L	old mark	5.53	6.63	1.10	–	0.01	0.00	3.15	3.14	1.05	1.05	4.07	6.90	2.83	1.32	0.44	1.77	0.59	0.15
		new mark	2.70	4.03	1.33	2.92	–	–	–	–	–	–	2.40	6.94	4.54	–	–	–	–	–
Group B 2	R	old mark	5.44	6.64	1.20	–	0.07	0.02	2.83	2.76	0.94	0.92	3.62	7.00	3.38	1.13	0.38	1.44	0.48	0.10
		new mark	2.90	4.17	1.27	2.83	–	–	–	–	–	–	2.42	7.00	4.58	–	–	–	–	–
Group B 3	0	old mark	5.27	6.34	1.07	–	-0.07	-0.02	2.71	2.79	0.90	0.93	3.83	6.57	2.74	1.71	0.57	1.67	0.56	0.04
		new mark	2.29	3.88	1.59	2.85	–	–	–	–	–	–	2.32	6.73	4.41	–	–	–	–	–
Group B 3	L	old mark	5.45	6.41	0.96	–	0.11	0.04	3.12	3.01	1.04	1.00	4.07	7.05	2.98	1.70	0.57	1.94	0.65	0.11
		new mark	2.31	3.71	1.40	3.35	–	–	–	–	–	–	2.22	7.05	4.83	–	–	–	–	–
Group B 3	R	old mark	5.25	6.77	1.52	–	0.06	0.02	3.11	3.05	1.04	1.02	3.63	7.12	3.48	1.06	0.35	1.84	0.61	0.08
		new mark	2.57	3.92	1.35	3.14	–	–	–	–	–	–	2.49	7.05	4.57	–	–	–	–	–
Group B 4	0	old mark	5.47	6.75	1.28	–	0.05	0.02	3.15	3.10	1.05	1.03	3.90	6.90	3.00	1.50	0.50	1.82	0.61	0.04
		new mark	2.42	3.90	1.48	2.98	–	–	–	–	–	–	2.37	6.88	4.51	–	–	–	–	–
Group B 4	L	old mark	5.90	6.66	0.76	–	-0.07	-0.02	3.17	3.24	1.06	1.08	4.01	6.94	2.94	1.45	0.48	1.74	0.58	0.14
		new mark	2.48	3.81	1.33	3.13	–	–	–	–	–	–	1.94	6.94	5.00	–	–	–	–	–
Mean						**2.867**		**0.006**			**0.970**	**0.964**					**0.498**		**0.557**	**0.074**
SD						**0.354**		**0.030**			**0.087**	**0.082**					**0.081**		**0.063**	**0.066**
Eruption rate increase (1) = (A-AA)/(C-CC)											**174.4%**									
Eruption rate increase (2) = (B-BB)/(C-CC)												**173.2%**								

DATE	12/06/00 (MM/DD/YY)	DAY	2																
		right incisor										left incisor							
		gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attrition	attrition rate	eruption in length	eruption rate	rate of length change
		(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC]]/day)	(D-DD)/day
Group B 1 0	old mark	4.26	6.48	2.22	–	0.00	0.00	2.11	2.10	1.05	1.05	3.44	7.00	3.56	1.04	0.52	1.34	0.67	0.15
	new mark	2.07	3.73	1.65	3.18	–	–	–	–	–	–	1.85	6.91	5.06	–	–	–	–	–
Group B 1 L	old mark	3.70	5.35	1.66	–	-0.02	-0.01	2.11	2.13	1.05	1.06	2.83	5.85	3 02	1.55	0.78	1.15	0.58	-0.20
	new mark	1.83	3.61	1.78	2.15	–	–	–	–	–	–	1.61	5.76	4.15	–	–	–	–	–
Group B 1 R	old mark	3.92	5.68	1.77	–	-0.02	-0.01	1.93	1.95	0.97	0.98	3.46	6.18	2.72	1.72	0 86	1.30	0.65	-0.21
	new mark	1.81	3.66	1.85	2.43	–	–	–	–	–	–	1.77	6.09	4.33	–	–	–	–	–
Group B 2 0	old mark	4.01	5.75	1.74	–	-0.05	-0.03	1.97	2.02	0.99	1.01	3.37	6.35	2.98	0.68	0.34	1.17	0.59	0 25
	new mark	2.35	3.74	1.39	2.61	–	–	–	–	–	–	1.89	6 35	4.45	–	–	–	–	–
Group B 2 L	old mark	4.90	6.24	1.34	–	-0.01	0.00	2.20	2.21	1.10	1.11	3.39	6.89	3.50	1.05	0.52	0.99	0.50	-0.03
	new mark	2.16	3.97	1.81	2.97	–	–	–	–	–	–	2.13	6.93	4.80	–	–	–	–	–
Group B 2 R	old mark	5.11	6.29	1.17	–	0.10	0.05	2.21	2.12	1.11	1.06	3.31	7.00	3.69	0.88	0.44	0.89	0.44	0.00
	new mark	2.39	3.96	1.56	3.07	–	–	–	–	–	–	2.09	7.02	4.93	–	–	–	–	–
Group B 3 0	old mark	4.20	5.81	1.61	–	-0.02	-0.01	1.91	1.93	0.96	0.97	3.41	6.96	3.54	0 87	0.43	1.10	0.55	0.11
	new mark	2.33	3.59	1.26	3.36	–	–	–	–	–	–	2.09	6.96	4.87	–	–	–	–	–
Group B 3 L	old mark	4.61	6.02	1.41	–	-0.02	-0.01	2.30	2.32	1.15	1.16	3.74	6.81	3.06	1.77	0.88	1.52	0.76	-0.12
	new mark	2.43	3.74	1.30	3.09	–	–	–	–	–	–	2.44	6.83	4.39	–	–	–	–	–
Group B 3 R	old mark	4.70	6.00	1.30	–	0.05	0.02	2.13	2.08	1.07	1.04	3.43	6.74	3.30	1.27	0.63	0.95	0.47	-0.16
	new mark	2.24	3.90	1.66	2.88	–	–	–	–	–	–	1.91	6.78	4.87	–	–	–	–	–
Group B 4 0	old mark	4.39	5.87	1.48	–	0.00	0.00	1.98	1.98	0.99	0.99	3.48	6.87	3.39	1.12	0.56	1.11	0.55	0.00
	new mark	2.39	3.66	1.27	3.19	–	–	–	–	–	–	2.12	6.85	4.73	–	–	–	–	–
Group B 4 L	old mark	4.65	5.99	1.34	–	-0.01	-0.01	2.16	2.18	1.08	1.09	3.00	6.94	3.94	1.07	0 53	1.06	0.53	0.00
	new mark	2.59	3.83	1.24	3.06	–	–	–	–	–	–	2.00	6.89	4.89	–	–	–	–	–
Mean					**2.909**		**0.000**			**1.046**	**1.046**					**0.591**		**0.572**	**-0.019**
SD					**0.366**		**0.020**			**0.064**	**0.058**					**0.178**		**0.093**	**0.148**
Eruption rate increase (1) = (A-AA)/(C-CC)										**183.0%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**183.0%**								

DATE	12/08/00 (MM/DD/YY)		DAY	2															
							right incisor										left incisor		
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC]/day)	rate of length change (D-DD)/day
Group B 1 0	old mark	4.33	5.99	1.66	–	0.00	0.00	2.26	2.26	1.13	1.13	3.16	6.81	3.65	1.41	0.71	1.31	0.66	-0.05
	new mark	2.32	3.86	1.54	2.89	–	–	–	–	–	–	2.16	6.75	4.59	–	–	–	–	–
Group B 1 L	old mark	4.03	5.81	1.78	–	0.00	0.00	2.21	2.20	1.10	1.10	2.88	6.35	3.47	0.68	0.34	1.27	0.63	0.29
	new mark	2.12	3.63	1.51	2.61	–	–	–	–	–	–	1 81	6.25	4.44	–	–	–	–	–
Group B 1 R	old mark	3.67	5.55	1.88	–	-0.03	-0.01	1.86	1.89	0.93	0.95	2.74	5.98	3.24	1.09	0.54	0.97	0.49	-0.06
	new mark	1.77	3.41	1.64	2.55	–	–	–	–	–	–	1.64	5.95	4.31	–	–	–	–	–
Group B 2 0	old mark	4.47	5.84	1.37	–	0.02	0.01	2.12	2.09	1.06	1.05	2.83	6.42	3.59	0.86	0.43	0.94	0.47	0.04
	new mark	2.15	3.41	1.26	2.94	–	–	–	–	–	–	2.18	6.36	4.18	–	–	–	–	–
Group B 2 L	old mark	4.48	6.22	1.74	–	0.07	0.03	2.33	2.26	1.16	1.13	3.14	6.97	3.83	0.97	0.49	1.01	0.50	0.02
	new mark	2.31	4.03	1.73	2.94	–	–	–	–	–	–	2.35	6.97	4.62	–	–	–	–	–
Group B 2 R	old mark	4.56	6.11	1.55	–	0.02	0.01	2.17	2.15	1.08	1.07	2.90	7.07	4.16	0.77	0.38	0.81	0.41	0.02
	new mark	2.59	3.88	1.29	3.07	–	–	–	–	–	–	2.58	6.95	4.37	–	–	–	–	–
Group B 3 0	old mark	4.57	5.84	1.26	–	0.00	0.00	2.24	2.24	1.12	1.12	3.45	7.16	3.72	1.15	0.58	1.36	0.68	0.10
	new mark	2.02	3.74	1.71	3.43	–	–	–	–	–	–	1.92	7.16	5.25	–	–	–	–	–
Group B 3 L	old mark	4.54	5.84	1.30	–	0.00	0.00	2.10	2.10	1.05	1.05	3.67	6.77	3.10	1.29	0 64	1.22	0.61	-0.03
	new mark	2.33	3.98	1.65	2.85	–	–	–	–	–	–	2.11	6.83	4.72	–	–	–	–	–
Group B 3 R	old mark	4.92	6.53	1.62	–	0.04	0.02	2.68	2.63	1.34	1.32	3.56	7.32	3.76	1.11	0 55	1.65	0.83	0.27
	new mark	2.70	3.83	1.14	3.52	–	–	–	–	–	–	2.46	7.35	4.89	–	–	–	–	–
Group B 4 0	old mark	4.68	5.97	1.29	–	-0.02	-0.01	2.29	2.31	1.14	1.16	3.28	7.07	3.80	0.94	0.47	1.16	0.58	0.11
	new mark	2.38	3.94	1.56	3.12	–	–	–	–	–	–	1.94	7.06	5.13	–	–	–	–	–
Group B 4 L	old mark	4.56	5.85	1.29	–	-0.04	-0.02	1.97	2.02	0.99	1.01	2.98	6.86	3.89	1.00	0.50	0.97	0.49	-0.01
	new mark	2.49	3.92	1.43	2.95	–	–	–	–	–	–	2 22	6.86	4.65	–	–	–	–	–
Mean					**2.987**		**0.002**			**1.101**	**1.098**					**0.512**		**0.576**	**0.064**
SD					**0.295**		**0.016**			**0.105**	**0.095**					**0.108**		**0.121**	**0.121**
Eruption rate increase (1) = (A-AA)/(C-CC)										**191.0%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**190.6%**								

DATE	12/11/00 (MM/DD/YY)			DAY	3															
		right incisor										left incisor								
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)	rate of length change (D-DD)/day
Group B 1	0 old mark	5.32	6.86	1.54	[illegible]	0.00	0.00	3.00	3.00	1.00	1.00	4.02	7.21	3.19	1.40	0.47	1.86	0.62	0.15
	new mark	2.35	4.10	1.76	3.06	–	–	–	–	–	–	2.00	7.17	5.17	–	–	–	–	–
Group B 1	L old mark	4.52	6.02	1.50	[illegible]	0.01	0.00	2.39	2.39	0.80	0.80	3.17	6.52	3.35	1.09	0.36	1.36	0.45	0 09
	new mark	2.20	3.52	1.32	3.04	–	–	–	–	–	–	2.05	6.56	4.51	–	–	–	–	–
Group B 1	R old mark	4.60	6.27	1.67	[illegible]	-0.03	-0.01	2.84	2.87	0.95	0.96	3.28	6.66	3.39	0.92	0.31	1.63	0.54	0.24
	new mark	2.11	3.71	1.61	2.96	–	–	–	–	–	–	1.92	6.67	4.76	–	–	–	–	–
Group B 2	0 old mark	5.02	6.23	1.22	[illegible]	0.04	0.01	2.86	2.82	0.95	0.94	3.65	6 67	3.02	1.16	0.39	1.48	0.49	0.11
	new mark	1.67	3.57	1.90	3.06	–	–	–	–	–	–	1.73	6.63	4.90	–	–	–	–	–
Group B 2	L old mark	5.30	6.95	1.65	[illegible]	0.07	0.02	2.99	2.92	1.00	0.97	3.81	7.22	3.41	1.21	0.40	1.46	0.49	0.08
	new mark	2.24	4.04	1.80	3.27	–	–	–	–	–	–	2.34	7.31	4.97	–	–	–	–	–
Group B 2	R old mark	5.67	6.73	1.06	[illegible]	0.22	0.07	3.07	2.85	1.02	0.95	3.95	7.16	3.21	1.16	0.39	1.36	0.45	0.07
	new mark	2.52	4.11	1.59	3.05	–	–	–	–	–	–	2.09	7.16	5.07	–	–	–	–	–
Group B 3	0 old mark	5.32	6.97	1.65	[illegible]	0.06	0.02	3.30	3.23	1.10	1.08	3.74	7.43	3.69	1.56	0.52	1.82	0.61	0.09
	new mark	2.58	4.24	1.65	3.13	–	–	–	–	–	–	2.35	7.36	5.01	–	–	–	–	–
Group B 3	L old mark	5.34	6.97	1.63	[illegible]	0.02	0.01	3.01	2.99	1.00	1.00	3.93	7.43	3.50	1.22	0.41	1.82	0.61	0.20
	new mark	2.44	3.94	1.50	3.53	–	–	–	–	–	–	2.21	7.47	5.26	–	–	–	–	–
Group B 3	R old mark	5.93	7.03	1.11	[illegible]	0.03	0.01	3.23	3.20	1.08	1.07	4.08	7.45	3.37	1.52	0.51	1.62	0.54	0.03
	new mark	2.67	4.34	1.67	3.12	–	–	–	–	–	–	2.26	7.47	5.21	–	–	–	–	–
Group B 4	0 old mark	5.50	7.00	1.50	[illegible]	0.06	0.02	3.12	3.05	1.04	1.02	3.78	7.62	3.84	1.28	0.43	1.85	0.62	0.19
	new mark	2.46	4.07	1.61	3.56	–	–	–	–	–	–	2.28	7.62	5.34	–	–	–	–	–
Group B 4	L old mark	5.58	6.97	1.39	[illegible]	0.04	0.01	3.10	3.05	1.03	1.02	3.83	7.64	3.81	0.84	0.28	1.61	0.54	0.26
	new mark	2.71	4.19	1.48	3.44	–	–	–	–	–	–	2.11	7.63	5.52	–	–	–	–	–
Mean					**3.201**		**0.016**			**0.997**	**0.981**					**0.405**		**0.542**	**0.137**
SD					**0.214**		**0.022**			**0.081**	**0.076**					**0.075**		**0.064**	**0.074**
Eruption rate increase (1) = (A-AA)/(C-CC)										**184.1%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**181.2%**								

DATE	12/13/00 (MM/DD/YY)		DAY	2																
							right incisor								left incisor					
			gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attriton	attrition rate	eruption in length	eruption rate	rate of length change
			(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC)]/day)	(D-DD)/day
Group B 1	0	old mark	4.61	6.24	1.62	–	0.14	0.07	2.27	2.13	1.13	1.07	3.26	6.94	3.68	1.49	0.74	1.26	0.63	-0.11
		new mark	2.66	4.09	1.43	2.87	–	–	–	–	–	–	2.08	6.96	4.88	–	–	–	–	–
Group B 1	L	old mark	4.18	5.48	1.30	–	0.03	0.01	1.98	1.96	0.99	0.98	3.12	6.13	3.01	1.51	0.75	1.07	0.54	-0.22
		new mark	1.71	3.19	1.48	2.94	–	–	–	–	–	–	1.75	6.13	4.37	–	–	–	–	–
Group B 1	R	old mark	4.15	5.69	1.55	–	0.06	0.03	2.04	1.98	1.02	0.99	3.11	6.57	3.45	1.30	0.65	1.19	0.60	-0.05
		new mark	2.28	3.53	1.26	2.97	–	–	–	–	–	–	2.07	6.51	4.44	–	–	–	–	–
Group B 2	0	old mark	3.72	5.67	1.95	–	-0.05	-0.03	2.05	2.10	1.02	1.05	2.58	6.26	3.68	1.22	0.61	0.86	0.43	-0.18
		new mark	2.34	3.79	1.45	2.52	–	–	–	–	–	–	2.13	6.31	4.18	–	–	–	–	–
Group B 2	L	old mark	4.44	6.25	1.80	–	0.00	0.00	2.21	2.21	1.10	1.10	3.21	6.95	3.74	1.23	0.61	0.87	0.44	-0.18
		new mark	2.53	4.31	1.78	2.69	–	–	–	–	–	–	2.32	7.00	4.68	–	–	–	–	–
Group B 2	R	old mark	4.63	6.17	1.54	–	0.05	0.03	2.11	2.06	1.06	1.03	2.85	7.13	4.28	0.79	0.39	0.76	0.38	-0.01
		new mark	2.62	4.40	1.78	2.72	–	–	–	–	–	–	1.97	7.12	5.15	–	–	–	–	–
Group B 3	0	old mark	4.61	6.32	1.71	–	-0.06	-0.03	2.03	2.09	1.01	1.04	3.44	7.34	3.89	1.12	0.56	1.09	0.55	-0.01
		new mark	2.64	4.27	1.62	3.07	–	–	–	–	–	–	2.34	7.34	5.00	–	–	–	–	–
Group B 3	L	old mark	4.57	6.07	1.50	–	0.00	0.00	2.14	2.13	1.07	1.07	3.49	7.19	3.70	1.55	0.78	1.27	0.64	-0.14
		new mark	2.27	3.72	1.45	3.38	–	–	–	–	–	–	2.04	7.10	5.06	–	–	–	–	–
Group B 3	R	old mark	4.55	6.17	1.62	–	0.05	0.02	1.87	1.83	0.94	0.91	3.01	7.27	4.26	0.95	0.47	0.75	0.38	-0.10
		new mark	2.51	3.98	1.47	3.25	–	–	–	–	–	–	2.36	7.23	4.87	–	–	–	–	–
Group B 4	0	old mark	4.25	5.80	1.56	–	0.05	0.03	1.79	1.74	0.89	0.87	3.16	7.06	3.90	1.44	0.72	0.88	0.44	-0.28
		new mark	2.58	3.72	1.15	3.31	–	–	–	–	–	–	2.48	7.04	4.56	–	–	–	–	–
Group B 4	L	old mark	4.42	5.87	1.45	–	0.03	0.01	1.70	1.68	0.85	0.84	2.73	7.43	4.70	0.83	0.41	0.62	0.31	-0.10
		new mark	2.75	3.90	1.15	3.63	–	–	–	–	–	–	2.32	7.53	5 21	–	–	–	–	–
Mean						**3.032**		**0.013**			**1.008**	**0.995**					**0.610**		**0.484**	**-0.126**
SD						**0.335**		**0.027**			**0.086**	**0.087**					**0.137**		**0.111**	**0.084**
Eruption rate increase (1) = (A-AA)/(C-CC)											**208.5%**									
Eruption rate increase (2) = (B-BB)/(C-CC)												**205.8%**								

DATE 12/15/00 (MM/DD/YY) **DAY** 2

			right incisor										left incisor							
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	difference of 2 teeth (D-B)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (1) (A-AA)	eruption in length (2) (B-BB)	eruption rate (1) ([A-AA]/day)	eruption rate (2) ([B-BB]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)	rate of length change (D-DD)/day
Group B 1	0	old mark	5.00	6.41	1.41	–	0.02	0.01	2.34	2.31	1.17	1.16	3.24	6.55	3.31	1.56	0.78	1.15	0.58	-0.21
		new mark	2.51	4.14	1.63	2.38	–	–	–	–	–	–	2.15	6.52	4.37	–	–	–	–	–
Group B 1	L	old mark	3.99	5.48	1.49	–	-0.02	-0.01	2.27	2.29	1.14	1.15	2.86	6.23	3.38	1.00	0.50	1.10	0.55	0.05
		new mark	1.93	3.55	1.62	2.67	–	–	–	–	–	–	2.27	6.22	3.96	–	–	–	–	–
Group B 1	R	old mark	4.42	5.67	1.26	–	0.00	0.00	2.14	2.14	1.07	1.07	3.02	6.16	3.14	1.29	0.65	0.95	0.48	-0.17
		new mark	2.49	4.05	1.56	2.15	–	–	–	–	–	–	2.24	6.20	3.96	–	–	–	–	–
Group B 2	0	old mark	4.46	5.95	1.49	–	-0.04	-0.02	2.12	2.16	1.06	1.08	3.01	6.65	3.64	0.54	0.27	0.88	0.44	0.17
		new mark	2.53	3.73	1.19	2.90	–	–	–	–	–	–	2.13	6.62	4.49	–	–	–	–	–
Group B 2	L	old mark	5.15	6.84	1.69	–	0.09	0.04	2.62	2.53	1.31	1.27	3.73	7.64	3.92	0.76	0.38	1.41	0.70	0.32
		new mark	3.23	4.50	1.28	3.25	–	–	–	–	–	–	2.69	7.76	5.07	–	–	–	–	–
Group B 2	R	old mark	4.81	6.41	1.60	–	0.18	0.09	2.19	2.01	1.09	1.01	2.89	6.94	4.05	1.10	0.55	0.92	0.46	-0.09
		new mark	2.73	4.33	1.61	2.53	–	–	–	–	–	–	2.26	6.87	4.61	–	–	–	–	–
Group B 3	0	old mark	4.52	6.15	1.62	–	0.00	0.00	1.88	1.88	0.94	0.94	3.25	6.97	3.72	1.28	0.64	0.91	0.45	-0.18
		new mark	2.40	3.77	1.36	3.32	–	–	–	–	–	–	2.21	7.08	4.87	–	–	–	–	–
Group B 3	L	old mark	4.64	6.09	1.45	–	0.00	0.00	2.36	2.36	1.18	1.18	3.40	7.10	3.70	1.36	0.68	1.36	0.68	0.00
		new mark	2.53	4.22	1.69	2.89	–	–	–	–	–	–	2.26	7.11	4.86	–	–	–	–	–
Group B 3	R	old mark	5.13	6.60	1.47	–	0.00	0.00	2.62	2.62	1.31	1.31	3.57	7.60	4.03	0.85	0.42	1.21	0.61	0.18
		new mark	2.66	4.79	2.12	2.87	–	–	–	–	–	–	2.47	7.66	5.19	–	–	–	–	–
Group B 4	0	old mark	4.68	5.91	1.23	–	-0.09	-0.04	2.10	2.19	1.05	1.09	3.66	7.22	3.55	1.01	0.50	1.19	0.59	0.09
		new mark	2.73	4.57	1.84	2.62	–	–	–	–	–	–	2.79	7.19	4.40	–	–	–	–	–
Group B 4	L	old mark	5.15	6.28	1.13	–	0.02	0.01	2.40	2.37	1.20	1.19	3.35	7.59	4.24	0.97	0.49	1.03	0.51	0.03
		new mark	3.12	4.46	1.34	3.23	–	–	–	–	–	–	2.51	7.69	5.17	–	–	–	–	–
Mean						**2.802**		**0.008**			**1.138**	**1.131**					**0.533**		**0.551**	**0.018**
SD						**0.373**		**0.034**			**0.112**	**0.108**					**0.147**		**0.091**	**0.170**
Eruption rate increase (1) = (A-AA)/(C-CC)											**206.6%**									
Eruption rate increase (2) = (B-BB)/(C-CC)												**205.3%**								

DATE	12/18/00 (MM/DD/YY)		DAY	3															
					right incisor							left incisor							
		gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	difference of 2 teeth	attrition	attrition rate	eruption in length (1)	eruption in length (2)	eruption rate (1)	eruption rate (2)	gingiva to cut mark	gingiva to incisal edge	cut mark to incisal edge	attrition	attrition rate	eruption in length	eruption rate	rate of length change
		(A)	(B)	(B-A)	(D-B)	(BB-AA)-(B-A)	[(BB-AA)-(B-A)]/day	(A-AA)	(B-BB)	([A-AA]/day)	([B-BB]/day)	(C)	(D)	(D-C)	(DD-CC)-(D-C)	[(DD-CC)-(D-C)]/day	(C-CC)	([C-CC)]/day)	(D-DD)/day
Group B 1 0	old mark	5.41	6.83	1.41	–	0.21	0.07	2.90	2.69	0.97	0.90	3.90	6.43	2.53	1 84	0 61	1.75	0.58	-0.03
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 1 L	old mark	4.80	6.43	1.63	–	-0.01	0.00	2.88	2.88	0.96	0.96	3.75	6.77	3.02	0.94	0.31	1.48	0.49	0.18
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 1 R	old mark	5.17	6.63	1.46	–	0.10	0.03	2.68	2.58	0.89	0.86	3.93	6.81	2.88	1.08	0.36	1.69	0.56	0.20
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 2 0	old mark	5.41	6.33	0.91	–	0.28	0.09	2.88	2.60	0.96	0.87	3.36	6.41	3.05	1.44	0.48	1.22	0.41	-0.07
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 2 L	old mark	5.98	7.20	1.22	–	0.06	0.02	2.75	2.69	0.92	0.90	3.80	7.18	3.38	1.69	0.56	1.11	0.37	-0.19
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 2 R	old mark	5.52	7.04	1.52	–	0.08	0.03	2.79	2.71	0.93	0.90	3.51	7.51	4.00	0.60	0.20	1.25	0.42	0.21
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 3 0	old mark	5.72	7.07	1.35	–	0.02	0.01	3.31	3.30	1.10	1.10	4.01	7.33	3.33	1.54	0.51	1.79	0.60	0.08
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 3 L	old mark	5.65	7.35	1.70	–	-0.01	0.00	3.12	3.13	1.04	1.04	4.04	7.68	3.63	1.22	0.41	1.79	0.60	0.19
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 3 R	old mark	5.41	7.50	2.09	–	0.04	0.01	2.75	2.71	0.92	0.90	3.90	7 92	4.02	1.17	0.39	1.43	0.48	0.08
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 4 0	old mark	5.50	7.28	1.78	–	0.06	0.02	2.77	2.71	0.92	0.90	4.48	7.46	2.98	1.42	0.47	1.69	0.56	0.09
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Group B 4 L	old mark	5.80	7.18	1.38	–	-0.04	-0.01	2.68	2.72	0.89	0.91	3.72	7.63	3.91	1.27	0.42	1.21	0.40	-0.02
	new mark			0.00	0.00	–	–	–	–	–	–			0.00	–	–	–	–	–
Mean					**0.000**		**0.024**			**0.955**	**0.931**					**0.431**		**0.497**	**0.067**
SD					**0.000**		**0.032**			**0.065**	**0.075**					**0.116**		**0.087**	**0.132**
Eruption rate increase (1) = (A-AA)/(C-CC)										**192.1%**									
Eruption rate increase (2) = (B-BB)/(C-CC)											**187.2%**								

Appendix 3

DATE 11/20/00 (MM/DD/YY)

			right incisor						left incisor						
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1	0	old mark														
		new mark	2.85	6.22	3.37	--	--	--	--	2.64	6 29	3 65	--	--	--	--
Control 1	L	old mark														
		new mark	2.45	6.63	4 18	--	--	--	--	2.53	6 48	3 95	--	--	--	--
Control 1	R	old mark														
		new mark	2.70	6.48	3.77	--	--	--	--	3.30	6.72	3 42	--	--	--	--
Control 2	0	old mark														
		new mark	3.23	6.82	3.59	--	--	--	--	2.99	6.65	3.65	--	--	--	--
Control 2	L	old mark														
		new mark	2.92	7.19	4.27	--	--	--	--	2.73	7.27	4.54	--	--	--	--
Control 2	R	old mark														
		new mark	2.57	6.22	3.65	--	--	--	--	2.84	6 48	3 64	--	--	--	--
Control 3	0	old mark														
		new mark	3.01	7.31	4 30	--	--	--	--	3.14	6.91	3.77	--	--	--	--
Control 3	L	old mark														
		new mark	2.55	5 78	3.23	--	--	--	--	2.23	5.63	3 40	--	--	--	--
Control 3	R	old mark														
		new mark	2.16	6 41	4.25	--	--	--	--	1.91	6 00	4.09	--	--	--	--
Control 4	0	old mark														
		new mark	2.36	6.30	3.95	--	--	--	--	2.35	6.31	3 96	--	--	--	--
Control 4	L	old mark														
		new mark	1.92	6.65	4.73	--	--	--	--	1.83	6.30	4.46	--	--	--	--
Control 4	R	old mark														
		new mark	1.98	6.42	4 44	--	--	--	--	2.08	6.26	4.18	--	--	--	--

DATE 11/22/00 (MM/DD/YY) **DAY** 2

			right incisor							left incisor						
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1	0	old mark	4.03	6.01	1.98	1.39	0.69	1.18	0.59	3.87	5.90	2.04	1.61	0.81	1.22	0.61
		new mark	2.26	6.19	3.92	--	--	--	--	2.17	6.01	3.85	--	--	--	--
Control 1	L	old mark	3.49	6.79	3.30	0.88	0.44	1.04	0.52	3.48	6.83	3.35	0.60	0.30	0.95	0.48
		new mark	2.21	6.92	4.71	--	--	--	--	1.96	6.91	4.95	--	--	--	--
Control 1	R	old mark	3.72	6.51	2.79	0.99	0.49	1.02	0.51	4.12	6.88	2.75	0.67	0.34	0.82	0.41
		new mark	2.59	6.45	3.87	--	--	--	--	3.01	6.91	3.90	--	--	--	--
Control 2	0	old mark	4.72	7.20	2.49	1.10	0.55	1.48	0.74	4.04	6.78	2.74	0.92	0.46	1.05	0.52
		new mark	2.83	7.20	4.37	--	--	--	--	2.59	7.09	4.51	--	--	--	--
Control 2	L	old mark	4.63	7.71	3.08	1.19	0.60	1.71	0.85	4.04	7.40	3.36	1.18	0.59	1.31	0.65
		new mark	2.38	7.80	5.42	--	--	--	--	1.66	7.27	5.62	--	--	--	--
Control 2	R	old mark	4.08	6.62	2.55	1.10	0.55	1.50	0.75	4.11	6.88	2.77	0.88	0.44	1.27	0.64
		new mark	3.09	6.70	3.61	--	--	--	--	2.78	6.59	3.82	--	--	--	--
Control 3	0	old mark	4.31	7.01	2.70	1.59	0.80	1.30	0.65	4.29	6.57	2.28	1.49	0.74	1.15	0.57
		new mark	2.71	7.21	4.50	--	--	--	--	2.25	6.76	4.51	--	--	--	--
Control 3	L	old mark	3.80	5.72	1.92	1.31	0.65	1.25	0.62	3.75	5.81	2.07	1.33	0.67	1.51	0.76
		new mark	2.29	5.66	3.37	--	--	--	--	2.22	5.75	3.53	--	--	--	--
Control 3	R	old mark	3.51	6.42	2.90	1.35	0.67	1.35	0.68	3.52	6.40	2.88	1.21	0.61	1.60	0.80
		new mark	1.59	6.42	4.83	--	--	--	--	1.54	6.10	4.57	--	--	--	--
Control 4	0	old mark	3.56	6.61	3.05	0.90	0.45	1.21	0.60	3.72	6.32	2.59	1.37	0.68	1.37	0.69
		new mark	2.27	6.55	4.28	--	--	--	--	2.44	6.54	4.10	--	--	--	--
Control 4	L	old mark	3.12	6.66	3.54	1.18	0.59	1.20	0.60	3.18	6.63	3.46	1.01	0.50	1.34	0.67
		new mark	2.09	6.82	4.73	--	--	--	--	2.09	6.93	4.84	--	--	--	--
Control 4	R	old mark	3.25	6.36	3.11	1.32	0.66	1.26	0.63	3.23	6.19	2.96	1.22	0.61	1.14	0.57
		new mark	1.84	6.65	4.81	--	--	--	--	1.42	6.25	4.83	--	--	--	--
Mean						**1.192**	**0.596**	**1.291**	**0.646**				**1.123**	**0.561**	**1.230**	**0.615**
SD						**0.212**	**0.106**	**0.196**	**0.098**				**0.314**	**0.157**	**0.223**	**0.112**
Average eruption rate																**0.630**
Average attrition rate																**0.579**

DATE	11/24/00 (MM/DD/YY)	DAY	2													
			right incisor						left incisor							
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	3.38	6.11	2.73	1.19	0.60	1.12	0.56	3.44	6.10	2.65	1.19	0.60	1.28	0 64
	new mark	2.18	6.32	4.14	--	--	--	--	2.03	6.16	4.12	--	--	--	--
Control 1 L	old mark	3.14	6.76	3.62	1.09	0.55	0.93	0.46	3.20	7.00	3.80	1.16	0.58	1.24	0.62
	new mark	2.23	6.84	4.61	--	--	--	--	2.32	6.94	4.63	--	--	--	--
Control 1 R	old mark	3.73	6.50	2.77	1.10	0.55	1.14	0.57	4.16	6.88	2.72	1.18	0.59	1.14	0.57
	new mark	2.35	6.47	4.12	--	--	--	--	2.78	6.84	4.06	--	--	--	--
Control 2 0	old mark	3.97	7.15	3.18	1.19	0.60	1.14	0.57	3.67	7.08	3.41	1.10	0.55	1.08	0.54
	new mark	2.23	7.01	4.78	--	--	--	--	2.62	7.33	4.71	--	--	--	--
Control 2 L	old mark	3.37	6.71	3.34	2.08	1.04	0.99	0.50	3.53	6.98	3.45	2.17	1.08	1.88	0.94
	new mark	2.10	6.66	4.55	--	--	--	--	2.14	7.17	5.03	--	--	--	--
Control 2 R	old mark	4.04	6.72	2.68	0.93	0.47	0.95	0.47	4.01	6.97	2.96	0.85	0.43	1.23	0.62
	new mark	2.42	6.85	4.43	--	--	--	--	2.31	7.06	4.75	--	--	--	--
Control 3 0	old mark	3.89	7.08	3.20	1.31	0.65	1.18	0.59	3.42	6.64	3.22	1.29	0.64	1.17	0.59
	new mark	2.49	7.08	4.59	--	--	--	--	2.06	6.72	4.67	--	--	--	--
Control 3 L	old mark	3.52	5.85	2.34	1.04	0.52	1.23	0.61	3.55	5.97	2.42	1.11	0.55	1.33	0.66
	new mark	2.33	5.86	3.53	--	--	--	--	2.31	5.90	3.59	--	--	--	--
Control 3 R	old mark	2.49	6.36	3.87	0.96	0.48	0.90	0.45	3.03	6.38	3.35	1.21	0.61	1.49	0.75
	new mark	2.27	6.40	4.13	--	--	--	--	2.11	6.25	4.14	--	--	--	--
Control 4 0	old mark	3.20	6.41	3.21	1.07	0.54	0.93	0.47	3.81	6.67	2.86	1.24	0.62	1.37	0.68
	new mark	2.40	6.55	4.15	--	--	--	--	2.40	6.69	4.29	--	--	--	--
Control 4 L	old mark	3.02	6.67	3.66	1.07	0.53	0.93	0.46	2.97	6.68	3.71	1.13	0.56	0.88	0.44
	new mark	2.86	6.72	3.86	--	--	--	--	2.52	6.64	4.12	--	--	--	--
Control 4 R	old mark	2.98	6.54	3.56	1.25	0.63	1.14	0.57	2.64	6.31	3.67	1.16	0.58	1.22	0.61
	new mark	2.35	6.49	4.14	--	--	--	--	2.23	6.23	4.00	--	--	--	--
Mean					**1.191**	**0.596**	**1.047**	**0.524**				**1.232**	**0.616**	**1.276**	**0.638**
SD					**0.301**	**0.151**	**0.120**	**0.060**				**0.314**	**0.157**	**0.243**	**0.122**
Average eruption rate															**0.581**
Average attrition rate															**0.606**

DATE	11/27/00 (MM/DD/YY)	DAY	3													
					right incisor								left incisor			
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	4.07	6.20	2.13	2.01	0.67	1.89	0.63	3.98	6.26	2.28	1.84	0 61	1.95	0.65
	new mark	2.18	6.27	4.09	--	--	--	--	2 27	6.25	3.98	--	--	--	--
Control 1 L	old mark	3.81	7.06	3.25	1.35	0.45	1.58	0.53	3.77	6.98	3.22	1 41	0.47	1.45	0.48
	new mark	2.83	7.08	4.25	--	--	--	--	2.64	6.99	4.35	--	--	--	--
Control 1 R	old mark	4.31	5.71	1.39	2.73	0.91	1.96	0.65	4.55	5.86	1.31	2 74	0.91	1.77	0.59
	new mark	2.09	5.70	3.61	--	--	--	--	2.17	5.86	3.70	--	--	--	--
Control 2 0	old mark	4.21	7.18	2.96	1.82	0 61	1.98	0.66	4.31	7.05	2.74	1.96	0 65	1.69	0 56
	new mark	2.77	7.05	4.28	--	--	--	--	2 88	7.03	4.15	--	--	--	--
Control 2 L	old mark	4.08	7.30	3.22	1.33	0.44	1.98	0.66	3.69	7.05	3 36	1.67	0 56	1.55	0.52
	new mark	2.49	7.29	4.80	--	--	--	--	2.27	7.12	4 85	--	--	--	--
Control 2 R	old mark	4.00	6.73	2.73	1.70	0.57	1.58	0 53	3.91	6.89	2.98	1.77	0.59	1 61	0 54
	new mark	1.92	6.67	4.75	--	--	--	--	1.96	6.72	4.76	--	--	--	--
Control 3 0	old mark	4.47	7.22	2.75	1.85	0.62	1.98	0.66	3.99	6.67	2 68	1 98	0 66	1.93	0.64
	new mark	2 43	7.12	4.69	--	--	--	--	2.24	6.78	4.54	--	--	--	--
Control 3 L	old mark	4.42	6.07	1.65	1.88	0.63	2.09	0.70	4 57	5 61	1.04	2 54	0.85	2.25	0.75
	new mark	2.40	6.00	3.60	--	--	--	--	2.09	5.50	3.41	--	--	--	--
Control 3 R	old mark	4.31	6.44	2.14	1.99	0 66	2 04	0.68	4.05	6.13	2.09	2.05	0.68	1 93	0.64
	new mark	2.18	6.34	4.16	--	--	--	--	1.88	6.18	4.31	--	--	--	--
Control 4 0	old mark	3.98	6.40	2.43	1.73	0 58	1.58	0.53	4.24	6.56	2.32	1.97	0.66	1.84	0.61
	new mark	2.42	6.47	4.05	--	--	--	--	2.18	6.33	4.15	--	--	--	--
Control 4 L	old mark	4.83	7.10	2.27	1.60	0.53	1.97	0.66	4.54	6.76	2.22	1.90	0.63	2.02	0.67
	new mark	2.81	7.00	4.19	--	--	--	--	2 53	6 79	4 26	--	--	--	--
Control 4 R	old mark	4.19	6.14	1.95	2.19	0.73	1.84	0.61	4.16	6.22	2.06	1 93	0 64	1.93	0.64
	new mark	2.74	6.28	3.54	--	--	--	--	2.28	6.23	3.95	--	--	--	--
Mean					**1.847**	**0.616**	**1.872**	**0.624**				**1.981**	**0.660**	**1.826**	**0.609**
SD					**0.375**	**0.125**	**0.186**	**0.062**				**0.357**	**0.119**	**0.225**	**0.075**
Average eruption rate															**0.616**
Average attrition rate															**0.638**

DATE 11/29/00 (MM/DD/YY) **DAY** 2

			right incisor							left incisor						
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC]/day)
Control 1	0	old mark	3.53	5.41	1.88	2.20	1.10	1.34	0.67	3.39	5.76	2.37	1.61	0.80	1.12	0.56
		new mark	2.11	5.34	3.24	–	–	–	–	2.05	5.73	3.69	–	–	–	–
Control 1	L	old mark	3.88	6.92	3.04	1.21	0.60	1.05	0.52	3.96	7.05	3.09	1.26	0.63	1.32	0.66
		new mark	2.26	7.05	4.78	–	–	–	–	2.26	7.06	4.80	–	–	–	–
Control 1	R	old mark	3.17	6.56	3.39	0.22	0.11	1.08	0.54	3.65	7.05	3.40	0.30	0.15	1.49	0.74
		new mark	2.00	6.52	4.52	–	–	–	–	2.28	6.90	4.62	–	–	–	–
Control 2	0	old mark	3.69	7.47	3.78	0.49	0.25	0.92	0.46	3.66	7.33	3.67	0.48	0.24	0.78	0.39
		new mark	2.89	7.35	4.46	–	–	–	–	2.54	7.30	4.76	–	–	–	–
Control 2	L	old mark	3.75	7.33	3.58	1.22	0.61	1.26	0.63	3.58	7.17	3.58	1.27	0.63	1.31	0.66
		new mark	2.57	7.36	4.79	–	–	–	–	2.54	7.08	4.54	–	–	–	–
Control 2	R	old mark	3.37	7.14	3.78	0.98	0.49	1.45	0.72	3.27	7.12	3.86	0.90	0.45	1.31	0.65
		new mark	1.93	6.96	5.03	–	–	–	–	2.02	7.13	5.10	–	–	–	–
Control 3	0	old mark	3.74	7.07	3.33	1.36	0.68	1.30	0.65	3.43	6.64	3.21	1.33	0.67	1.19	0.59
		new mark	2.20	6.95	4.75	–	–	–	–	2.09	6.72	4.63	–	–	–	–
Control 3	L	old mark	3.64	5.57	1.93	1.67	0.83	1.24	0.62	3.47	5.62	2.15	1.26	0.63	1.39	0.69
		new mark	1.91	5.66	3.75	–	–	–	–	1.87	5.62	3.75	–	–	–	–
Control 3	R	old mark	3.21	6.56	3.35	0.81	0.41	1.03	0.52	2.87	6.30	3.43	0.88	0.44	1.00	0.50
		new mark	2.48	6.62	4.14	–	–	–	–	2.17	6.25	4.08	–	–	–	–
Control 4	0	old mark	3.45	6.35	2.89	1.16	0.58	1.04	0.52	3.55	6.55	3.00	1.15	0.58	1.37	0.68
		new mark	2.17	6.48	4.31	–	–	–	–	2.23	6.56	4.34	–	–	–	–
Control 4	L	old mark	4.02	7.03	3.01	1.18	0.59	1.21	0.60	3.74	6.82	3.08	1.18	0.59	1.21	0.60
		new mark	2.42	7.09	4.68	–	–	–	–	2.03	6.86	4.83	–	–	–	–
Control 4	R	old mark	3.88	6.64	2.76	0.78	0.39	1.14	0.57	3.24	6.44	3.20	0.75	0.38	0.95	0.48
		new mark	2.63	6.58	3.95	–	–	–	–	2.57	6.72	4.15	–	–	–	–
Mean						**1.106**	**0.553**	**1.172**	**0.586**				**1.032**	**0.516**	**1.202**	**0.601**
SD						**0.521**	**0.261**	**0.154**	**0.077**				**0.378**	**0.189**	**0.206**	**0.103**
Average eruption rate																**0.593**
Average attrition rate																**0.535**

DATE 12/01/00 (MM/DD/YY) **DAY** 2

			right incisor							left incisor						
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1	0	old mark	3.58	6.49	2.91	0.32	0.16	1.48	0.74	3.60	6.60	3.01	0 68	0 34	1 55	0 77
		new mark	2.27	6.59	4.32	--	--	--	--	2.15	6.56	4 42	--	--	--	--
Control 1	L	old mark	3 55	7.27	3.72	1.06	0.53	1 28	0.64	3.20	6.96	3.75	1.05	0.53	0.95	0.47
		new mark	2.52	7.30	4.78	--	--	--	--	2.52	7.19	4.66	--	--	--	--
Control 1	R	old mark	3.33	6.66	3.33	1.20	0.60	1.33	0.67	3.34	7.04	3.70	0.91	0.46	1.05	0.53
		new mark	2.16	6.73	4.57	--	--	--	--	2.42	7 02	4 59	--	--	--	--
Control 2	0	old mark	3.96	7.48	3.53	0.93	0.46	1.06	0.53	3.57	7.48	3.91	0.85	0.43	1.03	0.52
		new mark	2.05	7.49	5.44	--	--	--	--	2.21	7.53	5.31	--	--	--	--
Control 2	L	old mark	4.09	6.92	2.83	1.96	0.98	1 52	0.76	4.28	6.77	2.49	2.04	1.02	1.74	0.87
		new mark	2.78	6.93	4 15	--	--	--	--	2.88	6.80	3.93	--	--	--	--
Control 2	R	old mark	3.12	7.47	4.34	0.69	0.34	1.19	0.60	3.10	7.36	4 27	0.84	0.42	1.08	0 54
		new mark	2.43	7.59	5.17	--	--	--	--	2.39	7.48	5.09	--	--	--	--
Control 3	0	old mark	3.69	8.04	4.35	0.40	0 20	1 49	0.74	3.18	7.25	4.07	0 55	0.28	1.09	0.54
		new mark	2.75	7.95	5.20	--	--	--	--	2.14	7.11	4.97	--	--	--	--
Control 3	L	old mark	3.04	6.14	3.10	0.66	0 33	1 13	0 57	3 38	6.26	2 88	0 88	0.44	1.52	0.76
		new mark	2.22	6.24	4.02	--	--	--	--	2.25	6.17	3.92	--	--	--	--
Control 3	R	old mark	3.74	6.47	2.73	1.41	0.71	1 26	0 63	3.76	6 39	2.63	1.45	0.72	1.59	0.79
		new mark	2.25	6.35	4.10	--	--	--	--	2.14	6.34	4.20	--	--	--	--
Control 4	0	old mark	3.40	6.95	3.55	0.76	0.38	1.23	0 61	3.23	6.90	3.67	0.67	0.33	1.01	0.50
		new mark	2.63	6.97	4.33	--	--	--	--	2.52	6.94	4.42	--	--	--	--
Control 4	L	old mark	3.68	7.29	3.61	1.07	0 53	1.26	0.63	3 55	7 29	3 74	1.10	0 55	1.52	0.76
		new mark	2.03	7.28	5.25	--	--	--	--	2.11	7.26	5.15	--	--	--	--
Control 4	R	old mark	4.45	6.96	2.51	1.44	0.72	1.82	0.91	3.95	6.46	2.52	1.64	0.82	1.38	0.69
		new mark	2.29	6.82	4.53	--	--	--	--	2.14	6.48	4.34	--	--	--	--
Mean						**0.991**	**0.496**	**1.337**	**0.669**				**1.054**	**0.527**	**1.291**	**0.646**
SD						**0.470**	**0.235**	**0.207**	**0.103**				**0.442**	**0.221**	**0.282**	**0.141**
Average eruption rate																**0.657**
Average attrition rate																**0.511**

DATE	12/04/00 (MM/DD/YY)	DAY	3													
			right incisor						left incisor							
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	3.84	6.28	2.44	1.87	0.62	1.56	0.52	3.85	6.51	2.66	1.85	0.62	1.70	0.57
	new mark	2.46	6.45	3.99	--	--	--	--	2.29	6.51	4.23	--	--	--	--
Control 1 L	old mark	4.16	6.83	2.67	2.11	0.70	1.64	0.55	4.40	6.99	2.59	2.33	0.78	1.88	0.63
	new mark	2.44	6.86	4.42	--	--	--	--	2.76	7.00	4.24	--	--	--	--
Control 1 R	old mark	3.60	6.82	3.22	1.36	0.45	1.45	0.48	4.06	7.09	3.03	1.71	0.57	1.63	0.54
	new mark	2.57	6.78	4.22	--	--	--	--	2.79	7.12	4.33	--	--	--	--
Control 2 0	old mark	3.57	7.49	3.92	1.52	0.51	1.53	0.51	3.64	7.34	3.70	1.29	0.43	1.43	0.48
	new mark	2.12	7.37	5.25	--	--	--	--	1.92	7.31	5.39	--	--	--	--
Control 2 L	old mark	4.72	7.02	2.31	1.85	0.62	1.94	0.65	4.88	7.00	2.12	2.14	0.71	2.01	0.67
	new mark	2.55	7.06	4.52	--	--	--	--	2.60	7.00	4.40	--	--	--	--
Control 2 R	old mark	3.83	7.38	3.55	1.61	0.54	1.40	0.47	3.77	7.27	3.50	1.96	0.65	1.38	0.46
	new mark	2.55	7.36	4.81	--	--	--	--	2.60	7.43	4.82	--	--	--	--
Control 3 0	old mark	4.48	7.90	3.41	1.79	0.60	1.73	0.58	3.97	7.16	3.20	1.82	0.61	1.83	0.61
	new mark	2.74	7.83	5.10	--	--	--	--	2.38	7.08	4.70	--	--	--	--
Control 3 L	old mark	3.97	6.32	2.35	1.67	0.56	1.75	0.58	4.29	6.33	2.05	2.26	0.75	2.04	0.68
	new mark	2.23	6.41	4.18	--	--	--	--	2.59	6.40	3.81	--	--	--	--
Control 3 R	old mark	4.05	6.32	2.27	1.83	0.61	1.80	0.60	3.71	6.37	2.66	1.51	0.50	1.57	0.52
	new mark	2.22	6.45	4.23	--	--	--	--	2.41	6.32	3.92	--	--	--	--
Control 4 0	old mark	4.38	6.87	2.49	1.85	0.62	1.75	0.58	4.81	6.90	2.09	2.62	0.87	2.29	0.76
	new mark	2.38	6.88	4.50	--	--	--	--	2.53	6.90	4.37	--	--	--	--
Control 4 L	old mark	3.71	6.83	3.12	2.13	0.71	1.68	0.56	3.57	7.01	3.44	1.80	0.60	1.46	0.49
	new mark	1.86	6.82	4.96	--	--	--	--	1.99	6.98	4.99	--	--	--	--
Control 4 R	old mark	4.29	6.77	2.48	2.05	0.68	2.00	0.67	4.36	6.68	2.33	1.58	0.53	2.22	0.74
	new mark	2.13	6.85	4.72	--	--	--	--	2.05	6.73	4.68	--	--	--	--
Mean					**1.803**	**0.601**	**1.685**	**0.562**			**2.780**	**1.905**	**0.635**	**1.786**	**0.595**
SD					**0.234**	**0.078**	**0.182**	**0.061**				**0.379**	**0.126**	**0.309**	**0.103**
Average eruption rate															**0.578**
Average attrition rate															**0.618**

DATE	12/06/00 (MM/DD/YY)	DAY	2													
		right incisor							left incisor							
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	3.51	6.35	2.84	1.15	0.57	1.05	0.52	3.48	6.44	2.96	1.27	0.64	1.19	0.60
	new mark	2.20	6.33	4.13	--	--	--	--	2.31	6.42	4.11	--	--	--	--
Control 1 L	old mark	3.40	7.15	3.75	0.67	0.34	0.96	0.48	3.70	7.31	3.61	0.63	0.32	0.93	0.47
	new mark	1.65	7.19	5.53	--	--	--	--	2.05	7.33	5.28	--	--	--	--
Control 1 R	old mark	3.66	6.85	3.19	1.03	0.51	1.10	0.55	3.96	7.22	3.26	1.08	0.54	1.17	0.58
	new mark	2.01	6.89	4.87	--	--	--	--	2.46	7.24	4.78	--	--	--	--
Control 2 0	old mark	3.11	7.08	3.97	1.28	0.64	0.99	0.50	3.12	7.20	4.08	1.31	0.66	1.20	0.60
	new mark	1.62	7.10	5.49	--	--	--	--	1.91	7.28	5.37	--	--	--	--
Control 2 L	old mark	3.70	7.67	3.97	0.55	0.27	1.16	0.58	3.92	7.48	3.56	0.84	0.42	1.32	0.66
	new mark	1.77	7.61	5.83	--	--	--	--	2.02	7.52	5.50	--	--	--	--
Control 2 R	old mark	3.74	7.10	3.36	1.45	0.73	1.19	0.60	3.74	7.09	3.34	1.48	0.74	1.14	0.57
	new mark	1.87	7.03	5.16	--	--	--	--	2.02	6.96	4.93	--	--	--	--
Control 3 0	old mark	3.79	7.78	3.99	1.11	0.55	1.06	0.53	4.01	7.48	3.47	1.22	0.61	1.62	0.81
	new mark	2.48	7.79	5.31	--	--	--	--	2.12	7.41	5.30	--	--	--	--
Control 3 L	old mark	3.92	6.66	2.74	1.44	0.72	1.69	0.85	4.04	6.26	2.22	1.59	0.79	1.45	0.73
	new mark	2.37	6.57	4.20	--	--	--	--	2.00	6.22	4.22	--	--	--	--
Control 3 R	old mark	3.55	6.60	3.05	1.18	0.59	1.33	0.66	4.03	6.78	2.76	1.16	0.58	1.62	0.81
	new mark	2.15	6.64	4.49	--	--	--	--	2.20	6.77	4.57	--	--	--	--
Control 4 0	old mark	3.73	7.02	3.29	1.21	0.60	1.35	0.68	3.98	7.15	3.17	1.20	0.60	1.45	0.72
	new mark	1.87	7.11	5.24	--	--	--	--	2.35	7.19	4.85	--	--	--	--
Control 4 L	old mark	3.00	7.42	4.42	0.54	0.27	1.14	0.57	3.13	7.46	4.33	0.66	0.33	1.14	0.57
	new mark	1.77	7.50	5.73	--	--	--	--	1.79	7.45	5.66	--	--	--	--
Control 4 R	old mark	3.41	6.84	3.44	1.28	0.64	1.27	0.64	3.39	6.87	3.48	1.20	0.60	1.34	0.67
	new mark	1.70	6.92	5.22	--	--	--	--	1.78	6.89	5.11	--	--	--	--
Mean					**1.074**	**0.537**	**1.191**	**0.595**				**1.137**	**0.568**	**1.299**	**0.650**
SD					**0.319**	**0.159**	**0.201**	**0.100**				**0.296**	**0.148**	**0.209**	**0.104**

DATE	12/08/00 (MM/DD/YY)	DAY	2													
			right incisor						left incisor							
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	3.40	6.95	3.55	0.58	0.29	1.20	0.60	3.53	6.97	3.44	0.67	0.34	1.23	0.61
	new mark	1.93	6.87	4.94	–	–	–	–	2.02	7.06	5.04	–	–	–	–
Control 1 L	old mark	3.22	7.69	4.47	1.07	0.53	1.57	0.79	3.26	7.52	4.25	1.03	0.51	1.21	0.61
	new mark	1.84	7.65	5.81	–	–	–	–	1.68	7.53	5.85	–	–	–	–
Control 1 R	old mark	3.05	6.84	3.78	1.09	0.55	1.04	0.52	3.65	7.21	3.56	1.22	0.61	1.19	0.60
	new mark	1.74	6.89	5.16	–	–	–	–	2.04	7.21	5.17	–	–	–	–
Control 2 0	old mark	3.03	7.82	4.80	0.69	0.35	1.41	0.70	3.10	7.92	4.82	0.55	0.28	1.19	0.59
	new mark	1.88	7.73	5.86	–	–	–	–	1.98	7.82	5.85	–	–	–	–
Control 2 L	old mark	3.27	7.34	4.07	1.76	0.88	1.50	0.75	3.45	7.53	4.08	1.41	0.71	1.42	0.71
	new mark	2.05	7.44	5.40	–	–	–	–	1.76	7.63	5.87	–	–	–	–
Control 2 R	old mark	3.03	7.75	4.72	0.43	0.22	1.16	0.58	3.09	7.82	4.73	0.20	0.10	1.07	0.53
	new mark	1.76	7.63	5.87	–	–	–	–	1.99	7.89	5.91	–	–	–	–
Control 3 0	old mark	3.63	7.89	4.27	1.05	0.52	1.15	0.57	3.55	7.72	4.17	1.12	0.56	1.43	0.72
	new mark	2.41	8.09	5.68	–	–	–	–	2.35	7.63	5.29	–	–	–	–
Control 3 L	old mark	3.71	7.17	3.46	0.74	0.37	1.34	0.67	3.48	6.61	3.13	1.09	0.55	1.48	0.74
	new mark	1.98	7.22	5.24	–	–	–	–	1.33	6.65	5.32	–	–	–	–
Control 3 R	old mark	3.43	6.87	3.44	1.05	0.53	1.27	0.64	3.07	6.78	3.72	0.85	0.42	0.87	0.43
	new mark	2.06	6.98	4.92	–	–	–	–	1.71	6.79	5.08	–	–	–	–
Control 4 0	old mark	3.53	7.94	4.40	0.83	0.42	1.66	0.83	3.46	7.46	4.00	0.84	0.42	1.11	0.55
	new mark	2.16	7.74	5.58	–	–	–	–	2.07	7.37	5.30	–	–	–	–
Control 4 L	old mark	2.97	7.50	4.52	1.21	0.60	1.21	0.60	2.96	7.11	4.15	1.51	0.75	1.17	0.59
	new mark	1.91	7.52	5.61	–	–	–	–	1.91	7.15	5.24	–	–	–	–
Control 4 R	old mark	3.07	6.93	3.86	1.36	0.68	1.36	0.68	2.94	6.78	3.83	1.27	0.64	1.16	0.58
	new mark	2.11	6.95	4.84	–	–	–	–	1 85	6.71	4.85	–	–	–	–
Mean					**0.988**	**0.494**	**1.322**	**0.661**				**0.981**	**0.491**	**1.210**	**0.605**
SD					**0.365**	**0.182**	**0.186**	**0.093**				**0.377**	**0.189**	**0.170**	**0.085**

DATE 12/11/00 (MM/DD/YY) **DAY** 3

			right incisor						left incisor					
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark	3.56	6.47	2.91	2 03	0.68	1.63	0.54	3.80	6.49	2.69	2.35	0 78	1.78	0.59
	new mark			0.00	--	--	--	--			0 00	--	--	--	--
Control 1 L	old mark	3.59	8.00	4.41	1.39	0.46	1 74	0.58	3.51	7.87	4.36	1 49	0.50	1 83	0.61
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 1 R	old mark	3.46	7.24	3.78	1.38	0.46	1.72	0 57	3 78	7 62	3 84	1 33	0 44	1.74	0 58
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 2 0	old mark	3.44	8.00	4.57	1.29	0.43	1.56	0.52	3.57	7.98	4.41	1.43	0.48	1.59	0 53
	new mark	2.39	8.02	5.63	--	--	--	--	2.54	8.11	5.58	--	--	--	--
Control 2 L	old mark	3.49	8.05	4.56	0.84	0.28	1 44	0.48	3.61	8.01	4.40	1 46	0.49	1.85	0.62
	new mark	2.09	8.04	5.96	--	--	--	--	2.42	8.01	5.59	--	--	--	--
Control 2 R	old mark	3.84	7.63	3.79	2.08	0.69	2.08	0.69	3.61	7.58	3.97	1.93	0.64	1.62	0.54
	new mark	1.89	7.61	5.72	--	--	--	--	2.20	7.82	5.62	--	--	--	--
Control 3 0	old mark	4.03	7.81	3.79	1.89	0.63	1 62	0.54	4.35	7.19	2.84	2.45	0 82	2.00	0.67
	new mark	2.14	7.80	5.66	--	--	--	--	1.79	7.19	5.40	--	--	--	--
Control 3 L	old mark	3.80	7.62	3.82	1 42	0 47	1.82	0.61	3.48	7.19	3.71	1 61	0 54	2.15	0.72
	new mark	2.72	7.62	4.91	--	--	--	--	2 67	7.27	4 60	--	--	--	--
Control 3 R	old mark	3.70	6.84	3.14	1.78	0.59	1.64	0.55	3.51	6.65	3.14	1.94	0.65	1.80	0.60
	new mark	2.22	6.97	4.75	--	--	--	--	2.11	6 69	4.57	--	--	--	--
Control 4 0	old mark	3.54	7.87	4.33	1.25	0.42	1.38	0.46	3.71	7.69	3 98	1 32	0.44	1 64	0.55
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 4 L	old mark	3.39	7.82	4.42	1.19	0.40	1.48	0 49	3.72	7.65	3.92	1.31	0.44	1.81	0 60
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 4 R	old mark	3.93	6.91	2.98	1.87	0.62	1.83	0.61	3.97	6.92	2.96	1.90	0.63	2 11	0.70
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Mean					**1.533**	**0.511**	**1.663**	**0.554**				**1.711**	**0.570**	**1.828**	**0.609**
SD					**0.387**	**0.129**	**0.194**	**0.065**				**0.398**	**0.133**	**0.181**	**0.060**

DATE	12/13/00 (MM/DD/YY)		DAY	2												
					right incisor							left incisor				
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 1 L	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 1 R	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 2 0	old mark	3.42	7.90	4.48	1.15	0.57	1 03	0.51	3.47	7.83	4 36	1.22	0.61	0.94	0.47
	new mark	2.52	8.05	5.53	--	--	--	--	2.30	7.90	5.60	--	--	--	--
Control 2 L	old mark	3.23	7.61	4.38	1 57	0.79	1.14	0 57	3 74	7.81	4.08	1.51	0.76	1.32	0.66
	new mark	1.84	7.60	5.76	--	--	--	--	1.95	7.79	5 84	--	--	--	--
Control 2 R	old mark	3.17	7.69	4.53	1.19	0.60	1.28	0.64	3.08	7.36	4.28	1.34	0.67	0.88	0.44
	new mark	2.15	7.52	5.37	--	--	--	--	2 11	7 30	5 19	--	--	--	--
Control 3 0	old mark	3.30	7.63	4 33	1.33	0 67	1.17	0.58	3.16	7.58	4.41	0.99	0.49	1.37	0.69
	new mark	2.11	7.66	5 55	--	--	--	--	2.22	7.59	5.37	--	--	--	--
Control 3 L	old mark	3.81	7.19	3.38	1.53	0 76	1.10	0.55	3.49	6.45	2.96	1.63	0.82	0.81	0.41
	new mark	2.25	7.30	5.05	--	--	--	--	2.12	6.56	4 44	--	--	--	--
Control 3 R	old mark	3.51	7.26	3.75	1.00	0.50	1.29	0 64	3.40	7.15	3.74	0.83	0 41	1.29	0.64
	new mark	2.04	7.21	5 17	--	--	--	--	1.95	7.19	5 24	--	--	--	--
Control 4 0	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 4 L	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 4 R	old mark														
	new mark				--	--	--	--				--	--	--	--
					1.296	**0.648**	**1.167**	**0.584**				**1.252**	**0.626**	**1.101**	**0.551**
					0.225	**0.113**	**0.102**	**0.051**				**0.306**	**0.153**	**0.251**	**0.125**
Average eruption rate															**0.567**
Average attrition rate															**0.637**

DATE	12/15/00 (MM/DD/YY)	DAY	2													
			right incisor						left incisor							
			gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1	0	old mark														
		new mark				--	--	--	--							
Control 1	L	old mark														
		new mark				--	--	--	--				--	--	--	--
Control 1	R	old mark														
		new mark				--	--	--	--				--	--	--	--
Control 2	0	old mark	3 43	7 74	4 31	1 22	0 61	0 91	0 46	3 46	7 73	4 26	1 34	0 67	1 16	0 58
		new mark	2 17	7 67	5 50	--	--	--	--	2 28	7 77	5 50	--	--	--	--
Control 2	L	old mark	3 27	7 33	4 05	1 70	0 85	1 43	0 72	3 17	7 37	4 20	1 64	0 82	1 22	0 61
		new mark	2 13	7 35	5 22	--	--	--	--	2 17	7 40	5 23	--	--	--	--
Control 2	R	old mark	3 31	7 94	4 63	0 74	0 37	1 17	0 58	3 35	7 93	4 58	0 61	0 31	1 24	0 62
		new mark	2 21	7 88	5 67	--	--	--	--	2 16	7 97	5 81	--	--	--	--
Control 3	0	old mark	3 52	7 72	4 20	1 35	0 68	1 42	0 71	3 51	6 84	3 33	2 04	1 02	1 29	0 65
		new mark	2 07	7 76	5 69	--	--	--	--	1 70	6 76	5 06	--	--	--	--
Control 3	L	old mark	3 55	7 49	3 94	1 10	0 55	1 30	0 65	3 49	6 61	3 12	1 32	0 66	1 37	0 68
		new mark	2 16	7 40	5 24	--	--	--	--	1 65	6 55	4 90	--	--	--	--
Control 3	R	old mark	3 10	7 01	3 91	1 26	0 63	1 06	0 53	3 17	7 09	3 92	1 32	0 66	1 22	0 61
		new mark	1 95	7 11	5 16	--	--	--	--	2 18	7 06	4 89	--	--	--	--
Control 4	0	old mark														
		new mark				--	--	--	--				--	--	--	--
Control 4	L	old mark														
		new mark				--	--	--	--				--	--	--	--
Control 4	R	old mark														
		new mark				--	--	--	--				--	--	--	--
Mean						**1 231**	**0 615**	**1 215**	**0.607**				**1.377**	**0.689**	**1 250**	**0 625**
SD						**0 315**	**0.157**	**0 207**	**0 103**				**0.469**	**0.235**	**0.071**	**0.036**
Average eruption rate																**0.616**
Average attrition rate																**0.652**

DATE	12/18/00 (MM/DD/YY)	DAY	3												
		right incisor							left incisor						
		gingiva to cut mark (A)	gingiva to incisal edge (B)	cut mark to incisal edge (B-A)	attrition (BB-AA)-(B-A)	attrition rate [(BB-AA)-(B-A)]/day	eruption in length (A-AA)	eruption rate ([A-AA]/day)	gingiva to cut mark (C)	gingiva to incisal edge (D)	cut mark to incisal edge (D-C)	attrition (DD-CC)-(D-C)	attrition rate [(DD-CC)-(D-C)]/day	eruption in length (C-CC)	eruption rate ([C-CC)]/day)
Control 1 0	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 1 L	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 1 R	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 2 0	old mark	3 87	8.01	4.13	1.36	0.45	1.70	0.57	4.01	8.12	4.11	1.39	0.46	1.73	0.58
	new mark			0.00	--	--	--	--			0 00	--	--	--	--
Control 2 L	old mark	4.01	7.39	3.38	1.84	0.61	1.87	0.62	4.10	6.71	2.61	2.63	0.88	1.93	0.64
	new mark			0 00	--	--	--	--			0.00	--	--	--	--
Control 2 R	old mark	3.98	7 65	3.67	2.00	0 67	1.77	0 59	3.75	7 37	3.63	2.18	0 73	1.59	0 53
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 3 0	old mark	4.10	8.17	4.08	1.62	0.54	2.03	0.68	3.90	7.50	3.61	1.46	0 49	2.20	0 73
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 3 L	old mark	3.91	7.31	3.40	1.84	0.61	1.75	0 58	3.98	6.54	2.56	2 33	0.78	2 33	0 78
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 3 R	old mark	3.83	7.09	3.26	1.90	0.63	1.88	0.63	3.90	7.05	3 15	1 74	0 58	1.72	0.57
	new mark			0.00	--	--	--	--			0.00	--	--	--	--
Control 4 0	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 4 L	old mark														
	new mark				--	--	--	--				--	--	--	--
Control 4 R	old mark														
	new mark				--	--	--	--				--	--	--	--
Mean					**1.759**	**0.586**	**1.833**	**0.611**				**1.954**	**0.651**	**1.918**	**0.639**
SD					**0.231**	**0.077**	**0.119**	**0.040**				**0.502**	**0.167**	**0.294**	**0.098**
Average eruption rate															**0.625**
Average attrition rate															**0.619**