

## CHAPTER IV

### RESULTS

#### Part I: Longitudinal changes of WF6 epitope levels during orthodontic tooth movement

The profiles of all subjects and their teeth in this study were described as follows (Table 4.1).

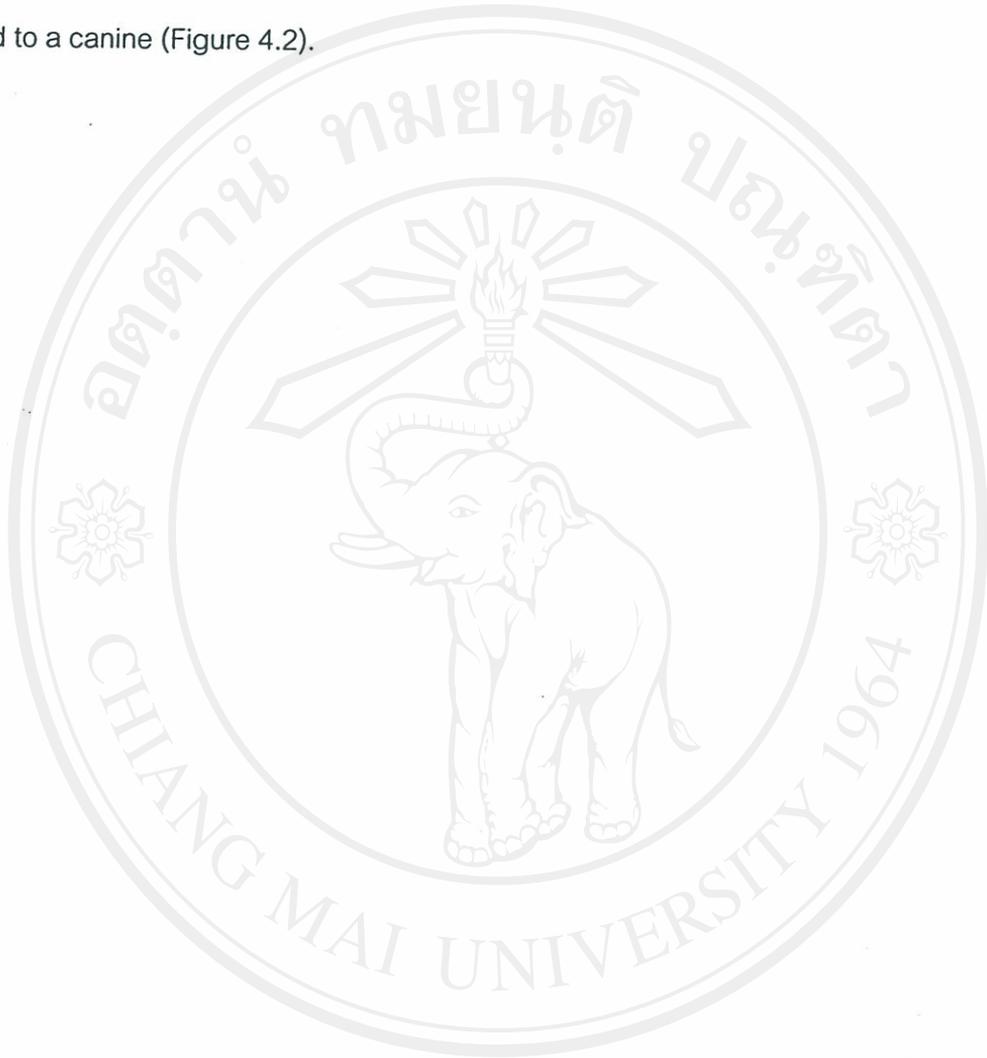
Table 4.1 All Subjects and their teeth in this study.

Patient' s code	Tooth	Age	Sex
C	11, 13	20	Female
D	11, 13, 23	21	Female
E	11, 13, 23	20	Female
H	11, 13, 23	20	Female

In almost all GCF samples collected from canines undergoing orthodontic tooth movement as well as control incisors, the WF6 epitopes of C-6-S and the total proteins could be detected by a competitive ELISA and total protein assay, respectively. The levels of WF6 epitopes in GCF sample were measured in nanogram per microgram (ng/ $\mu$ g) of total protein content. The amounts of WF6 epitope of C-6-S ranged from 1 nanogram to more than 10,000 nanograms.

All experimental and control teeth in this longitudinal study showed the WF6 epitope level changes. The changes included increased and decreased WF6 epitope levels. These longitudinal changes comprised many peaks of highest WF6 epitope levels during canine movement and after complete canine movement. These changes appeared cyclical at a 3-to 5-week interval during canine movement phase, consistent with the bone turn over rate (Figure 4.1). Compare to the cyclical changes of the WF6

epitope levels in the experimental teeth, the pattern of WF6 epitope level changes in control teeth was not specific and its levels appeared to be inconsistent with the force applied to a canine (Figure 4.2).



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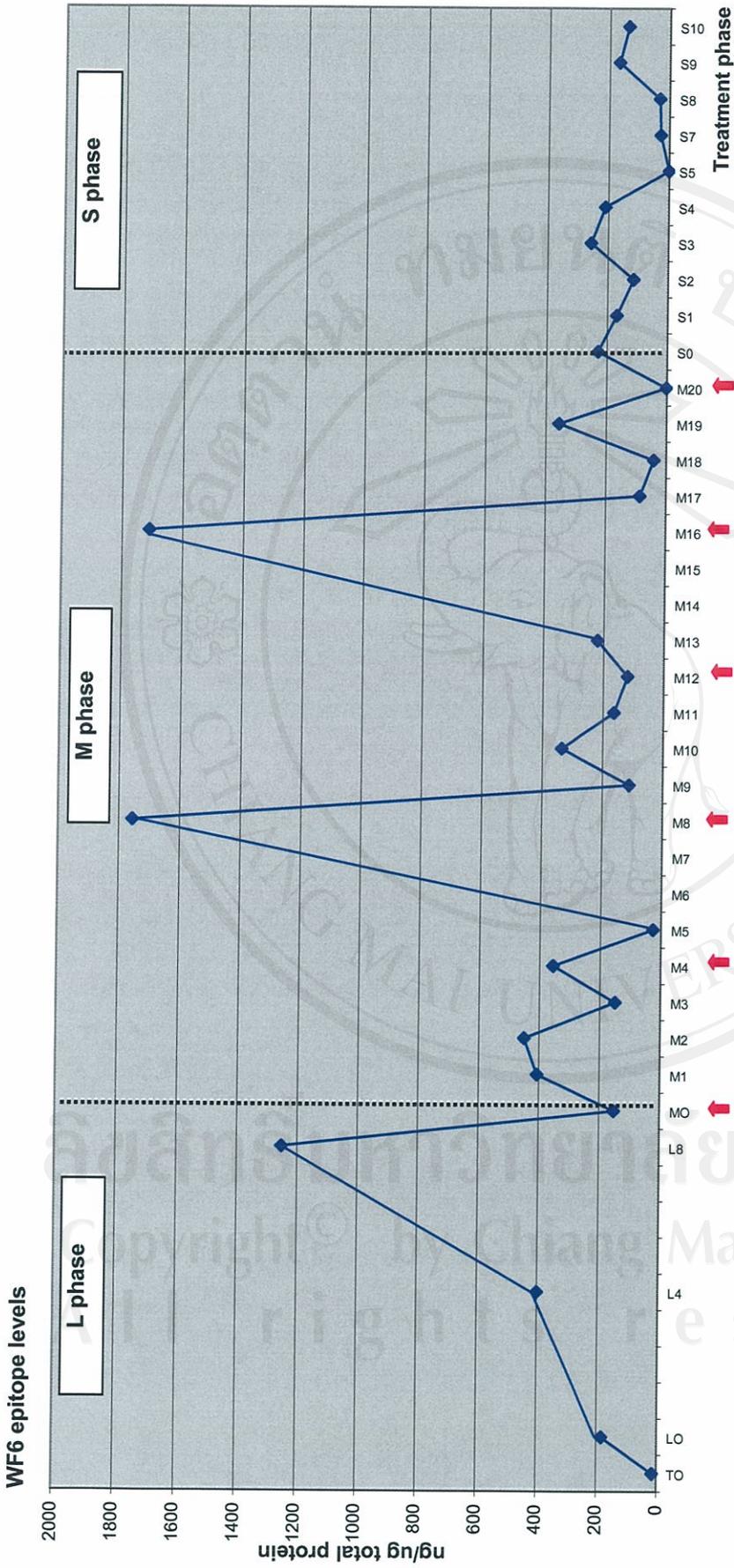


Figure 4.1 Longitudinal changes in WF6 epitope levels of a canine (ng/ug total protein). The red arrows indicated the time when a new closed coil spring was changed and the force was therefore applied to the canine.

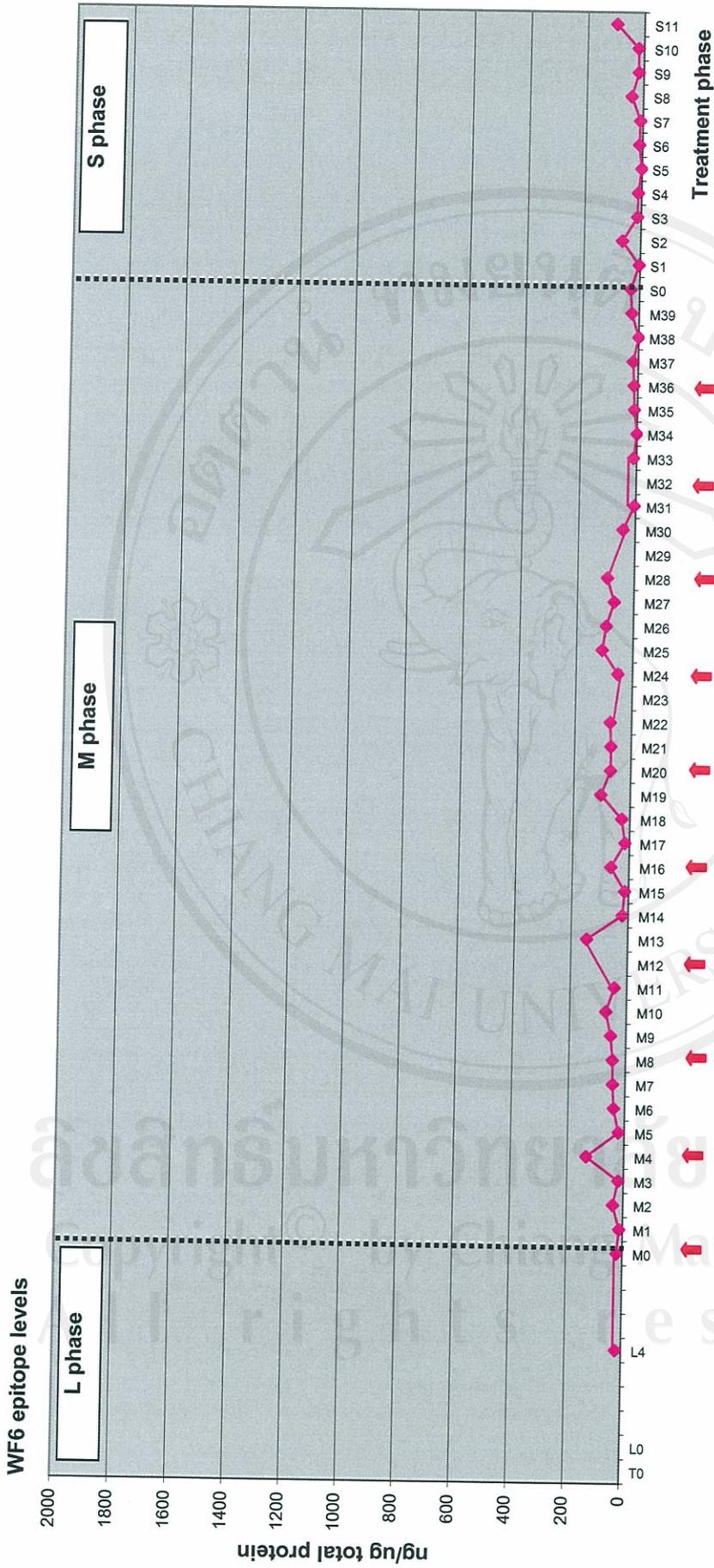


Figure 4.2 Longitudinal changes in WF6 epitope levels of an incisor (ng/ug total protein). The red arrows indicated the time when a new closed coil spring was changed and the force was therefore applied to the canine

During the canine movement phase, the differences between the maximum and the minimum values of the WF6 epitope levels in the canine were greater than those in the incisor. Moreover, the WF6 epitope levels of canine increased up to the maximum levels for several times. However, in the incisor, the WF6 epitope levels remained very low (Figure 4.2).

After complete canine movement (S phase), the WF6 epitope levels in the canine showed some peaks but with a much less degree. In the incisor, the WF6 epitope levels still remained very low without any obvious peak. During the leveling phase (or L phase) in the canine, the WF6 epitope levels increased up to a moderate level at some point, in this phase (Figure 4.1), which was in contrast to the control incisor, whose levels were still low (Figure 4.2).

#### Part II: Comparison of WF6 epitope levels during the first four weeks of canine movement phase and after complete canine movement phase

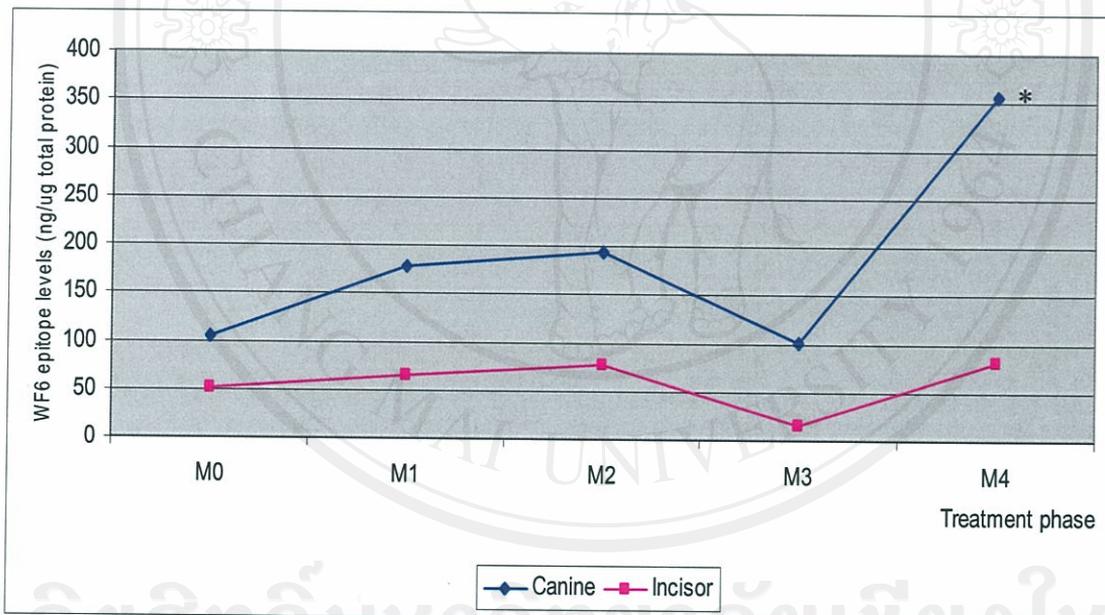
The following part focused on the changes of WF6 epitope levels during the first four weeks of canine movement phase (M0, M1, M2, M3 and M4) and after complete movement phase (S0, S1, S2, S3 and S4). The median values of WF6 epitope levels were calculated from both canine and incisor groups. The Friedman ANOVA test was used to compare the differences in the WF6 epitope levels in each group. The Wilcoxon signed ranks test was used to compare the difference between each treatment phase. The Wilcoxon Mann-Whitney U test was used to compare the WF6 epitope levels between canines and incisors.

The median values were shown in Table 4.2 and 4.3, and the graphs of the median values were shown in Figure 4.3 and 4.4.

Table 4.2 A summary of the medians of WF6 epitope levels (ng/μg total protein) of canines (n=7) and incisors (n=4) for the first four weeks of canine movement phase or M phase.

Treatment phase	Canine	Incisor
M0	104.29	52.43
M1	178.15	64.73
M2	194.63	76.32
M3	101.75	15.81
M4	356.69*	81.50

\* Significant difference from M0 (P=0.028)



\* Significant difference from M0 at P = 0.028

Figure 4.3 A linear graph showed the medians of WF6 epitope levels (ng/μg total protein) of canines (n=7) and incisors (n=4) for the first four weeks of canine movement phase or M phase.

After the first applied force to distalize canine, the medians of WF6 epitope levels of canines continually showed an increase from M0 to M2. At M3, the median of WF6 epitope levels of the canines slightly decreased; however, it increased at M4. The median of WF6 epitope levels at M4 was the highest value from M0 to M4. The Wilcoxon signed ranks test showed that there was a significant difference between M0 and M4 ( $P=0.028$ ), but no significant differences were found in other treatment phases ( $P > 0.05$ ).

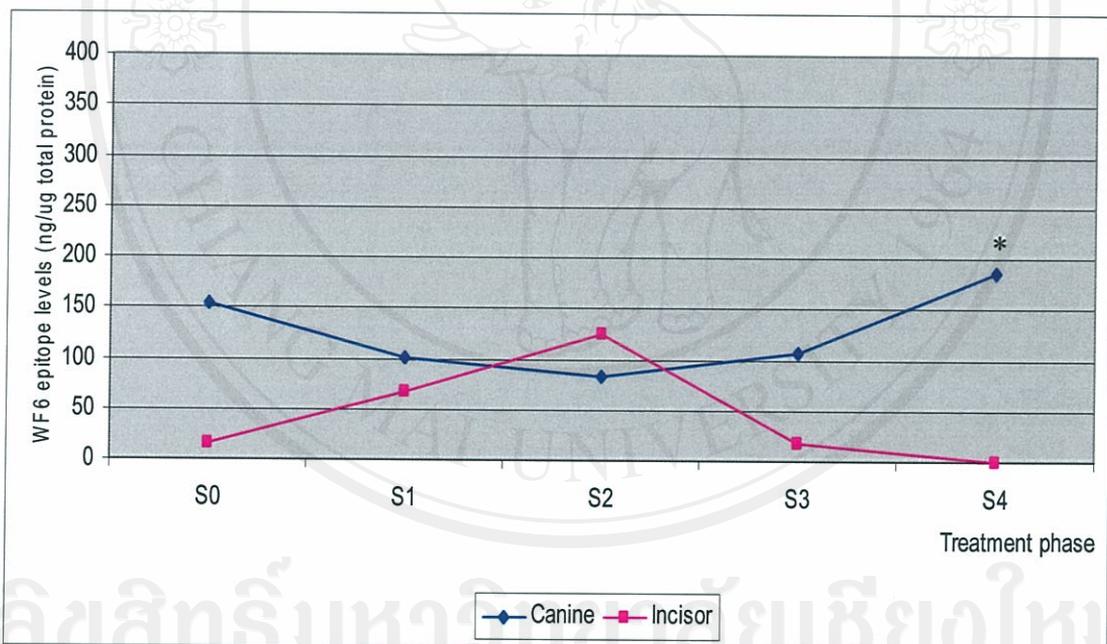
In contrast to those of the canines, the medians of WF6 epitope levels of the incisors did not increase. The medians of WF6 epitope levels were consistently low from M0 to M3, but slightly increased at M4. However, the Friedman ANOVA test showed no significant differences in ranking between M0, M1, M2, M3, and M4. The median values of WF6 epitope levels of incisors were shown in Table 4.2 and the graph of the median values of incisors was shown in Figure 4.3.

In each treatment phase during canine movement phase (M0, M1, M2, M3, and M4), the median of WF6 epitope levels of the canines was higher than that of the incisors at the same time. Therefore, the Wilcoxon Mann-Whitney U test was used to compare the medians of WF6 epitope levels between the canines and the incisors in each treatment phase. It was demonstrated that there were no significant differences between the canines and the incisors in every treatment phase ( $P > 0.05$ ).

Table 4.3 A summary of the medians of WF6 epitope levels (ng/μg total protein) of canines (n=7) and incisors (n=4) for the first four weeks after complete canine movement phase or S phase.

Treatment phase	Canine	Incisor
S0	229.79	15.46
S1	103.95	66.87
S2	114.36	124.75
S3	33.34	18.02
S4	163.33*	0.55

\* Significant difference from the incisor at S4 (P= 0.006)



\* Significant difference from the incisor at S4 (P= 0.006)

Figure 4.4 A linear graph showed the medians of WF6 epitope levels (ng/μg total protein) of canines (n=7) and incisors (n=4) for the first four weeks after complete canine movement phase or S phase.

After complete canine movement phase (S phase), the medians of WF6 epitope levels of the canines continually decreased from S0 to S2, but continually increased from S2 to S4. The Friedman ANOVA test showed that there were no significant differences among these values ( $P > 0.05$ ).

In contrast to those of the canines, the medians of WF6 epitope levels of incisors continually increased from S0 to S2, but continually decreased from S2 to S4. Similar to the canines, the Friedman ANOVA test showed no significant differences among the medians of WF6 epitope levels of incisors ( $P > 0.05$ ). The median values of incisors were shown in Table 4.3, and the graph of median values of the incisors was shown in Figure 4.4.

To compare the medians of WF6 epitope levels of the canines and the incisors at each treatment phase after complete canine movement phase, the Wilcoxon Mann-Whitney U test showed that there was a significant difference at S4 between the canines and the incisors ( $P = 0.006$ ), but no significant differences were found in other treatment phases ( $P > 0.05$ ).