CHAPTER 5

CONCLUSION

Part I. Illustrate the expression patterns of BMPs family member in primary culture derived from intramembranous and endochondral bone.

There are many studies utilized the *in vitro* osteoblastic cell culture instead of the *in vivo* study to examine the properties of the osteoblast. However no study has been reported the different that may be exist in both condition. It obviously demonstrated that the expression of BMPs family in primary cell culture condition was lower by half when compare to the expression of them in the fresh human bone samples. This critical point should be highly concerning when the osteoblastic cell culture was used to represent the response of osteoblastic cell related to BMPs expression.

Part II. Identify and compare the member of bone morphogenetic proteins (BMPs) family expression in human intramembranous and endochondral bone.

Bone morphogenesis proteins which first extracted and purified from bovine endochondral bone matrix were the widely excepted factors that responded in stimulated mesenchymal stem cell to differentiate to be osteoblast, as well as, play role in maturation and mineralization of osteoblast. This study first reported the expression of BMP9 and BMP13 in human intramembranous bone. BMP9 was currently reported to induce endochondral bone formation. However the function of BMP13 related to bone cells required further study.

It clearly demonstrated that there were different in expression of BMPs member between human intramembranous and endochondral bone. The message for BMP3, BMP4, BMP7, and BMP8 were significant higher expressed in intramembranous bone. However, BMP2 and BMP5 were highly expressed in endochondral bone. It might be hypothesized that BMP3 which previously reported as the antagonist of BMP2 reduce the opportunity of cartilaginous formation in intramembranous ossification.

Moreover the proportion of each BMP composed in intramembranous and endochondral bone matrix was significantly different. This distinction might relate in

maintaining homeostasis of intramembranous and endochondral bone remodeling under normal function.

Part III. Identify the osteoinductive factors extracted from human intramembranous and endochondral bone.

It demonstrated that human intramembranous and endochondral bone matrix which have been reported to have osteoinductive property composed the different biochemical substance. From previous report it clearly demonstrated that intramembranous bone matrix induced new bone formation through intramembranous pathway, while endochondral bone matrix induced de novo bone via endochondral sequence. Proteins component extracted from human intramembranous bone show the unique band below 43 and 21 kDa which were absent or present in much lower amount in comparable endochondral protein fractions. This significant distinct may explain the different in new bone formation inducing by two types of bone. However it seemed to be impracticable to isolate these proteins from human intramembranous bone due to the limitation in the amount of the starting bone material and the small number of the proteins component.

Figure 19 Diagram proposed the relation of each BMP in process of bone formation through intramembranous and endochondral bone.