



Objectives

Hypoparathyroidism (HypoPT) is a rare endocrine disorder characterized by hypocalcemia and low or undetectable levels of parathyroid hormone (PTH). The clinical symptoms of HypoPT patients include perioral numbness, muscle cramps, paresthesia et.al. These symptoms are mainly due to hypocalcemia since PTH functions as a key mediator in mineral ion homeostasis and skeleton remodeling. The skeletal dynamics of HypoPT patients are reported to be affected. As a crucial part of the skeletal system, orofacial bone harbours distinct developmental origin and osteogenic pattern. However, the remodeling and regeneration of orofacial bone under HypoPT condition remains unknown.

Methods

In the current study, we applied bilateral parathyroidectomy (PTX) and unilateral extraction of maximal first molar to 8 weeks SD rats to establish four surgery groups, including sham group, PTX group, sham+extraction group and PTX+extraction group.

Figure 1. Hypo-PT rat model was built under the guidance of carbon nanoparticles suspension injection and confirmed by ELISA assay.

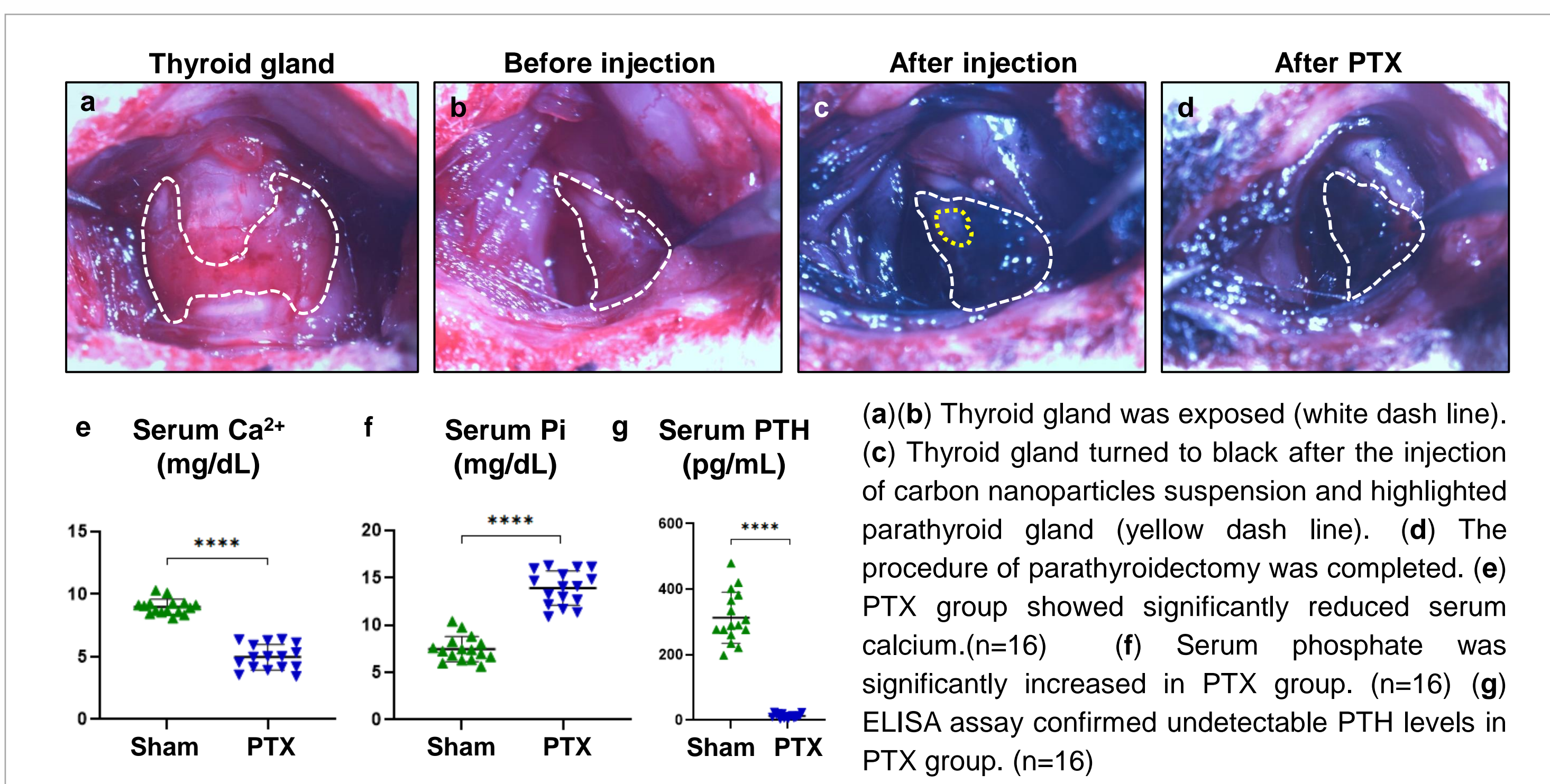


Figure 2. MicroCT analysis of alveolar bone volume at 7, 14, 28 post operative days (POD).

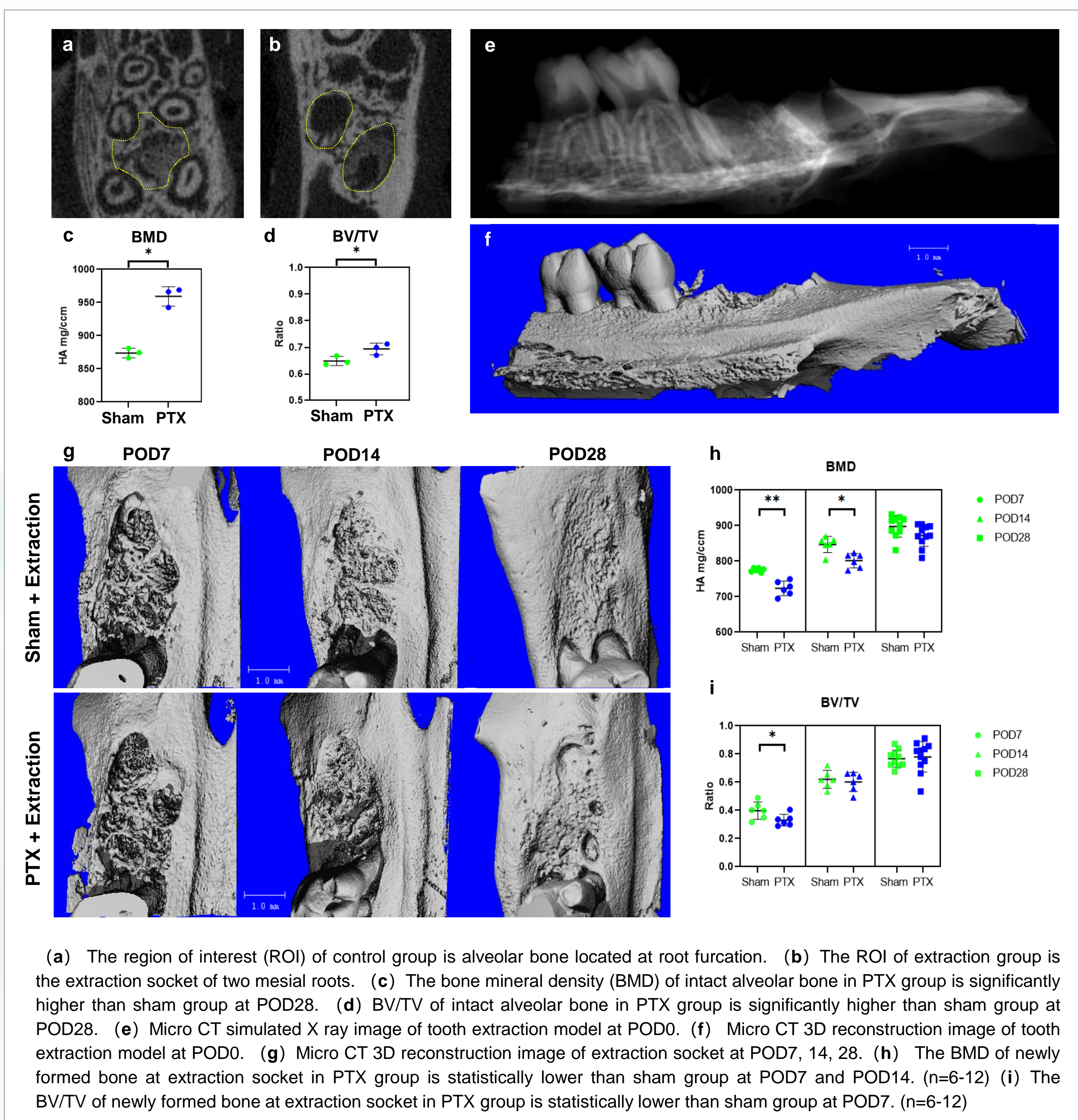


Figure 3. Histology and immunostaining analysis of bone regeneration and remodeling condition at extraction socket.

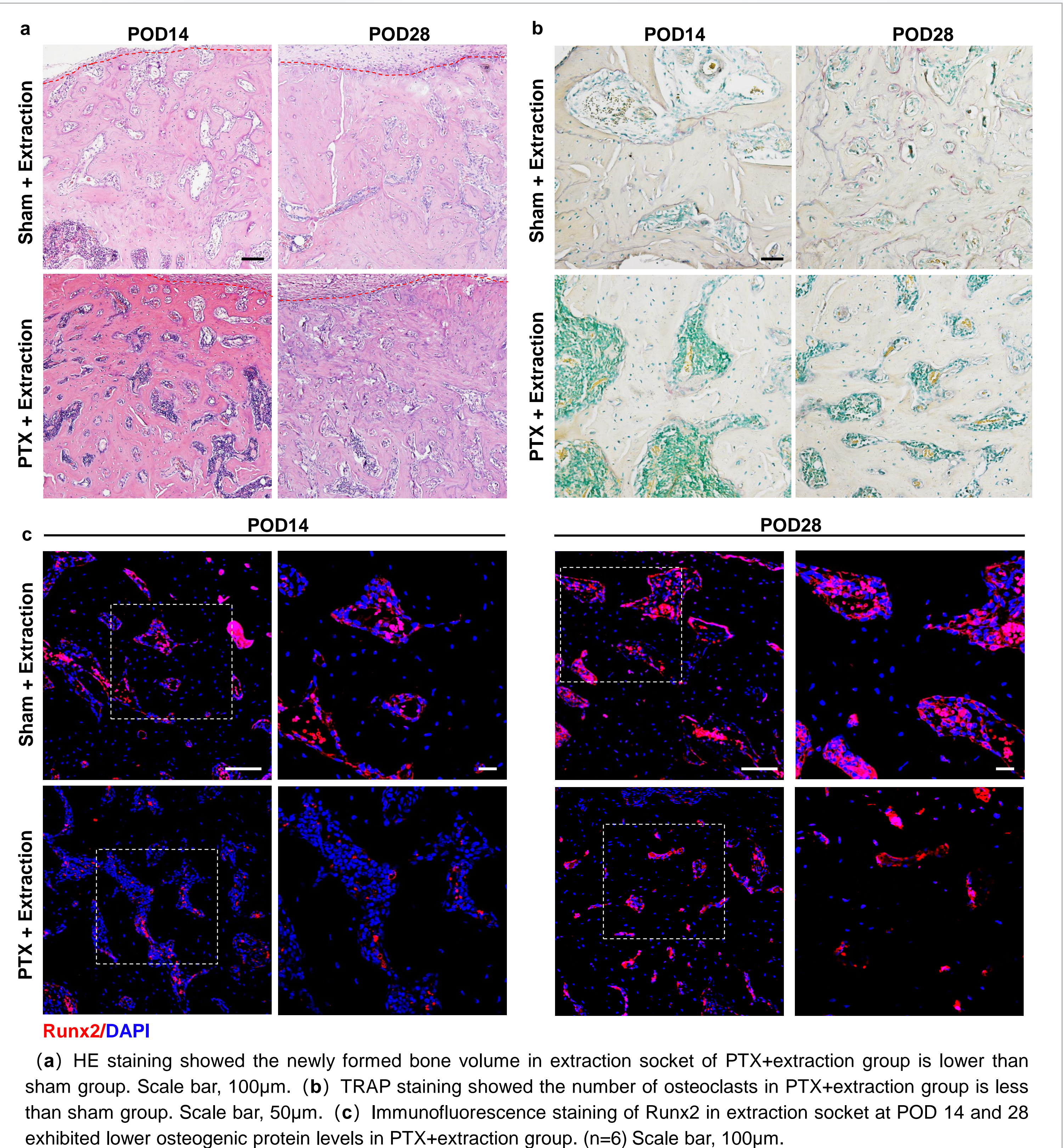
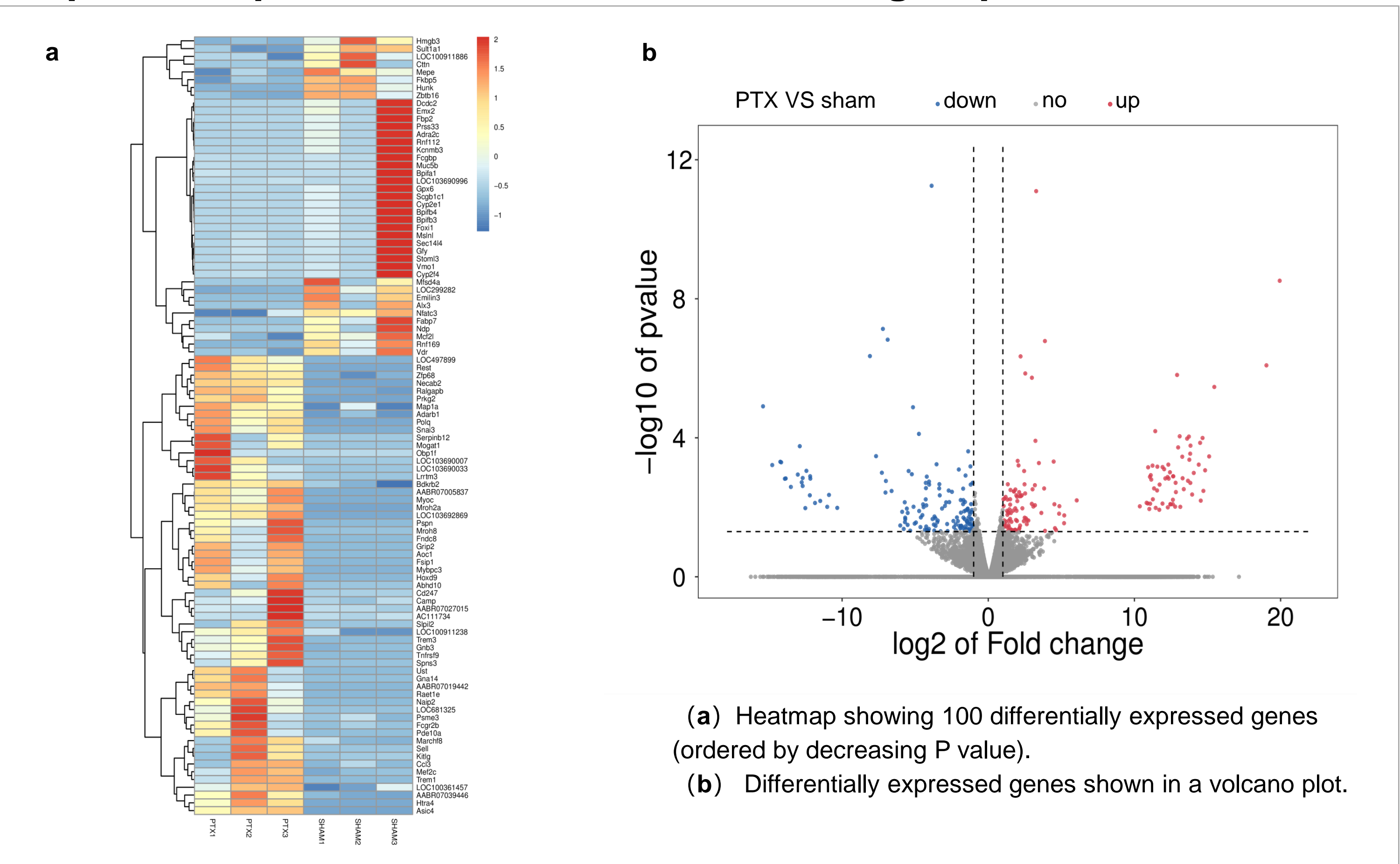


Figure 4. RNAseq analysis revealed significant changes in expression pattern between PTX and sham group.



Conclusions

In summary, our study successfully generated HypoPT rat model and found that HypoPT suppressed bone remodeling, ultimately led to higher alveolar bone volume under physiological condition. Yet, HypoPT resulted in impeded bone turnover, which delayed the repair and regeneration of the extraction socket. These results provide fundamental basis for diagnosis and treatment of orofacial bone defects related diseases in HypoPT patients.

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