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Iron Metabolism in the Development and Ageing of Odontoblast

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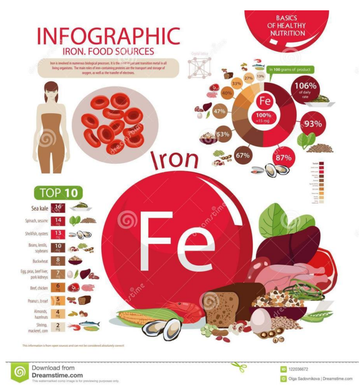
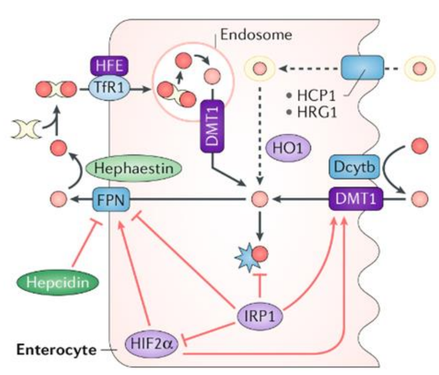
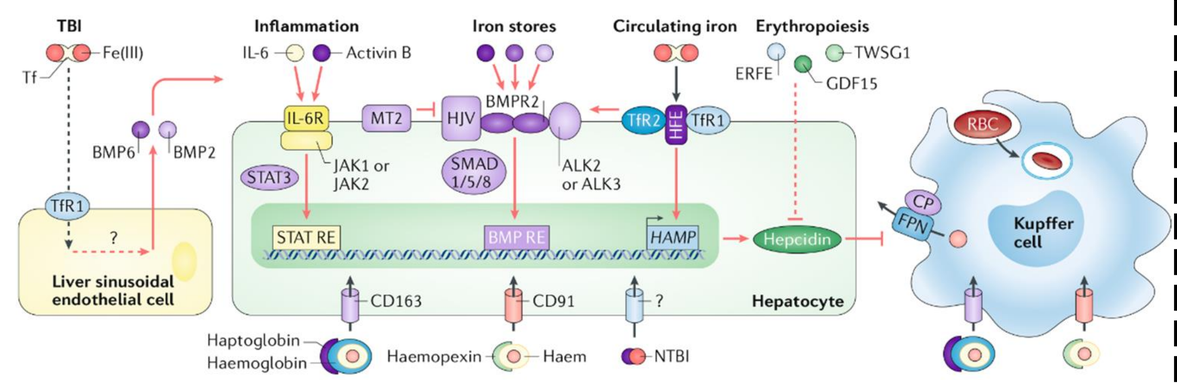
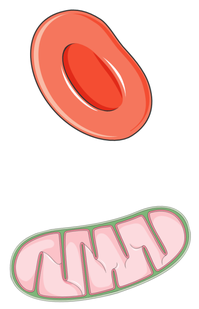
Background

Uptake from food | Absorb from Duodenum | Store and Recycle in Liver | Function in Erythrocytes and Mitochondria









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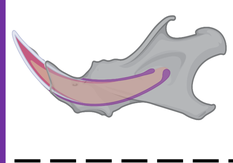
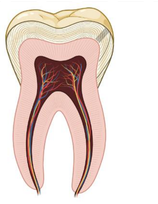
Iron is an essential element that is indispensable for life. Body iron homeostasis is a delicate balance and orchestrated by series iron regulatory proteins (IRPs). Imbalance in iron homeostasis, both insufficient or overloaded, is associated with many pathological processes. As the core of the dentin-pulp complex, odontoblast functions to maintain the bioactivity of the dental pulp. However, either the physiological or pathological role of iron in odontoblast is still largely unknown. In this study, we intend to primarily reveal the basic process of iron metabolism in the development and ageing of odontoblast.

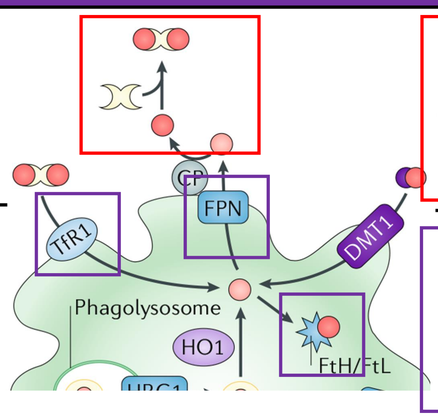
Materials and Methods



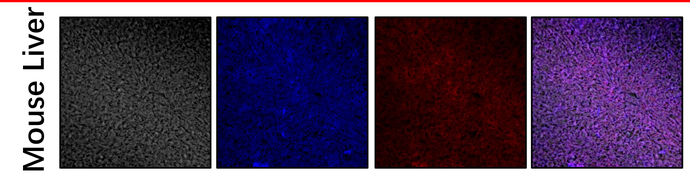
Mouse (C57BL/6) mandibular incisor were used to investigate the role of iron metabolism in the development of odontoblast



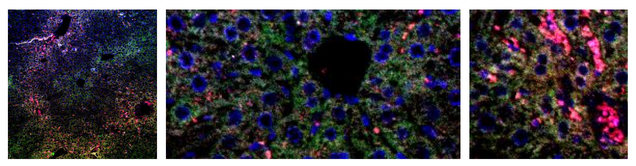
Human dental pulp of different ages were used to investigate the role of iron metabolism in ageing of odontoblast.



A Fe^{3+}-specific Aggregation-induced Emission (AIE) probe TPE-o-Py was used for *in situ* detection of iron (Fe^{3+})

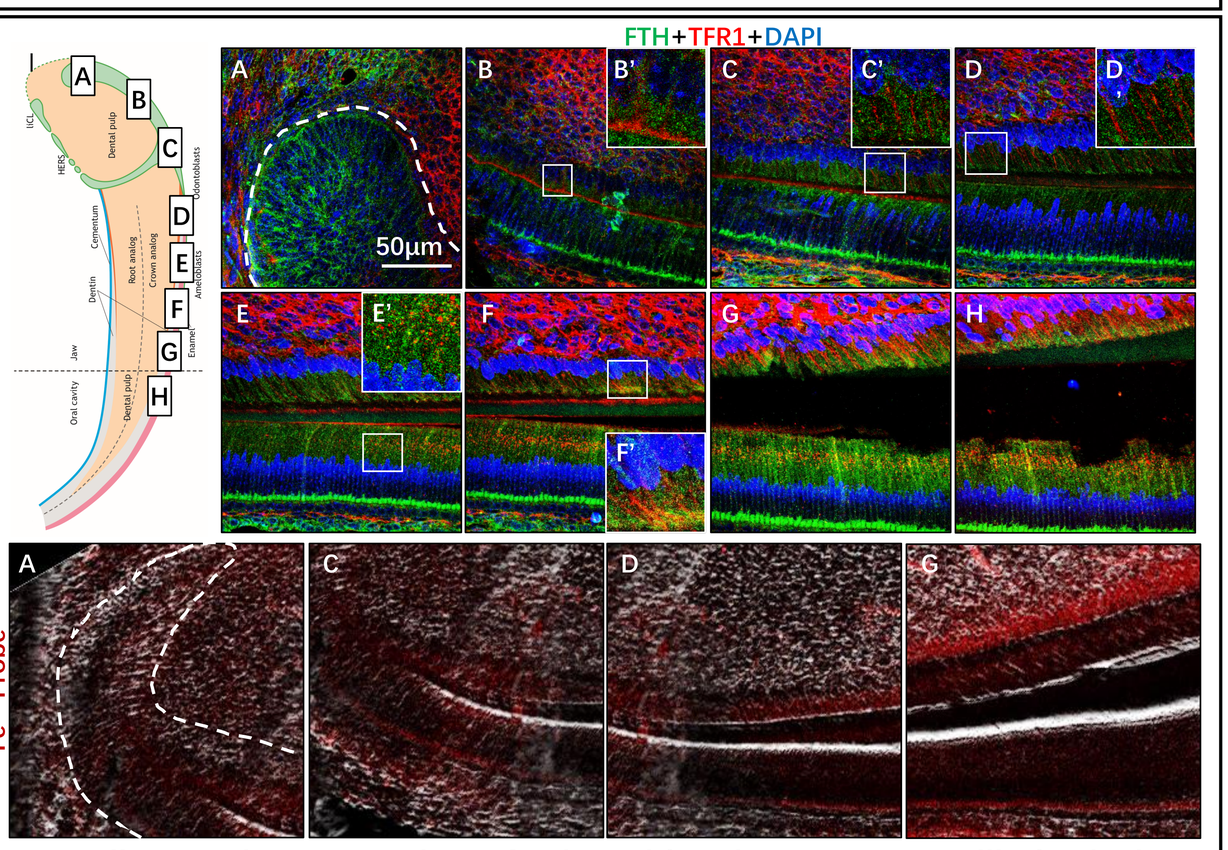


IRPs (Transferrin receptor-1, Ferritin, and Ferroportin) was detected by immunofluorescence staining



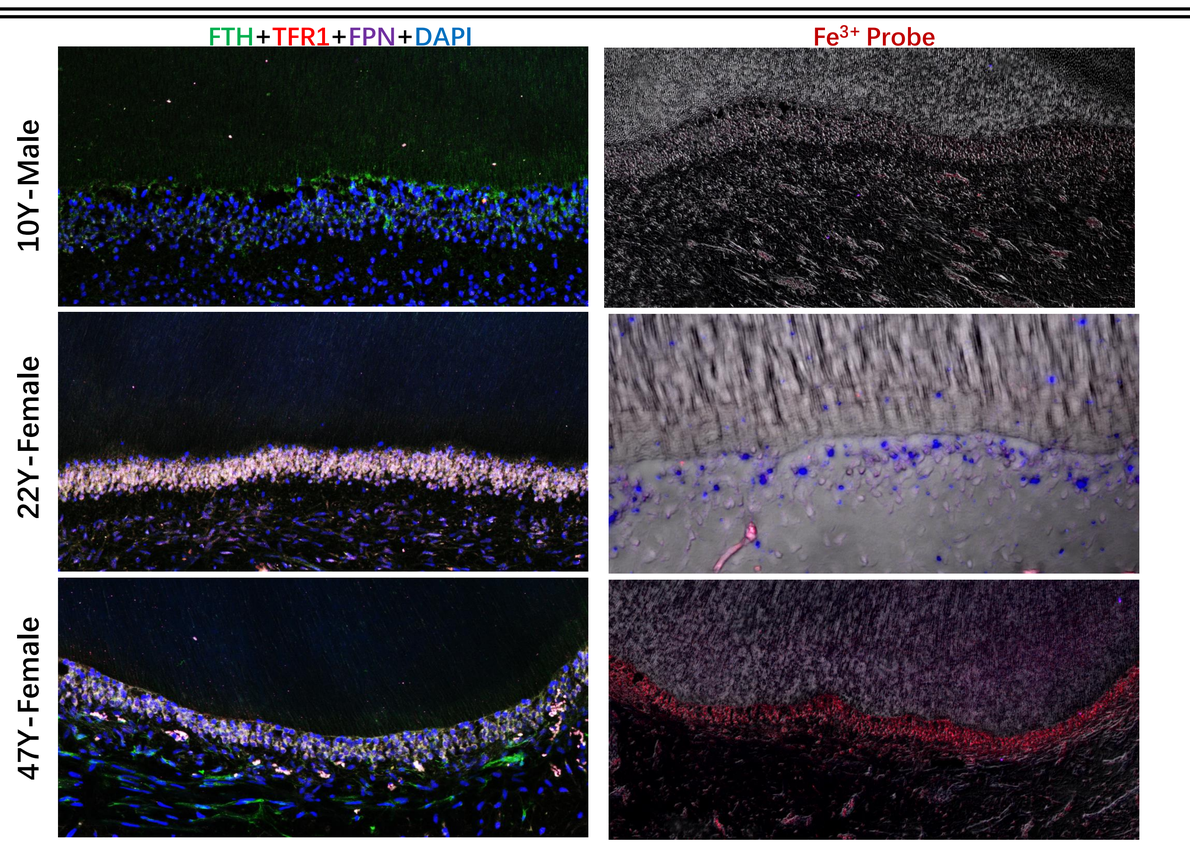
Results

Iron and IRPs in the Development of Odontoblast



According to the maturation of odontoblast in mouse mandibular incisor, the expression of IRPs and the accumulation of iron gradually increased from labial cervical loops, the stem cell niche, to the distal region of matured odontoblast.

Iron and IRPs in the Ageing of Odontoblast



In the ageing process of odontoblast, the content of iron altered in an age-dependent manner, which could be supported by the gradually increased signal of iron in human dental pulp from 10 to 47 years old. The expression of IRPs shared a similar distribution pattern.

Conclusion

The accumulation of iron and the upregulated expression of IRPs were positively related to the maturation and ageing process of odontoblast. The underlying mechanism through which iron affects the differentiation and maintaining homeostasis of odontoblast requires further investigation.

Acknowledgement

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