

## 低氧/厌氧产品案例——低氧与口腔牙周炎研究

**文章题目：** The possible role of sirtuin 5 in the pathogenesis of apical periodontitis

sirtuin 5在根尖牙周炎发病机制中的可能作用

文章出处： Oral Dis, 2020 .国立台湾大学医学院牙科学院

工作站使用情况： Invivo2

使用气体浓度： 2% O<sub>2</sub>

**主要内容：** 本课题研究了成骨细胞中sirtuin 5 (SIRT5)的表达与根尖牙周炎进展的关系，并检测了SIRT5在缺氧诱导的活性氧(ROS)形成和成骨细胞凋亡中的作用。研究发现在大鼠根尖牙周炎中，疾病进展伴随着SIRT5表达降低、氧化应激增加和骨内膜细胞凋亡增强。体外培养的成骨细胞在缺氧条件下SIRT5被抑制。SIRT5过表达可改善缺氧增强的ROS形成、线粒体去极化、细胞色素c渗漏、caspase-3激活和PARP碎裂；表明SIRT5能够缓解缺氧增强的成骨细胞凋亡，揭示SIRT5增强可能对根尖牙周炎有治疗潜力。

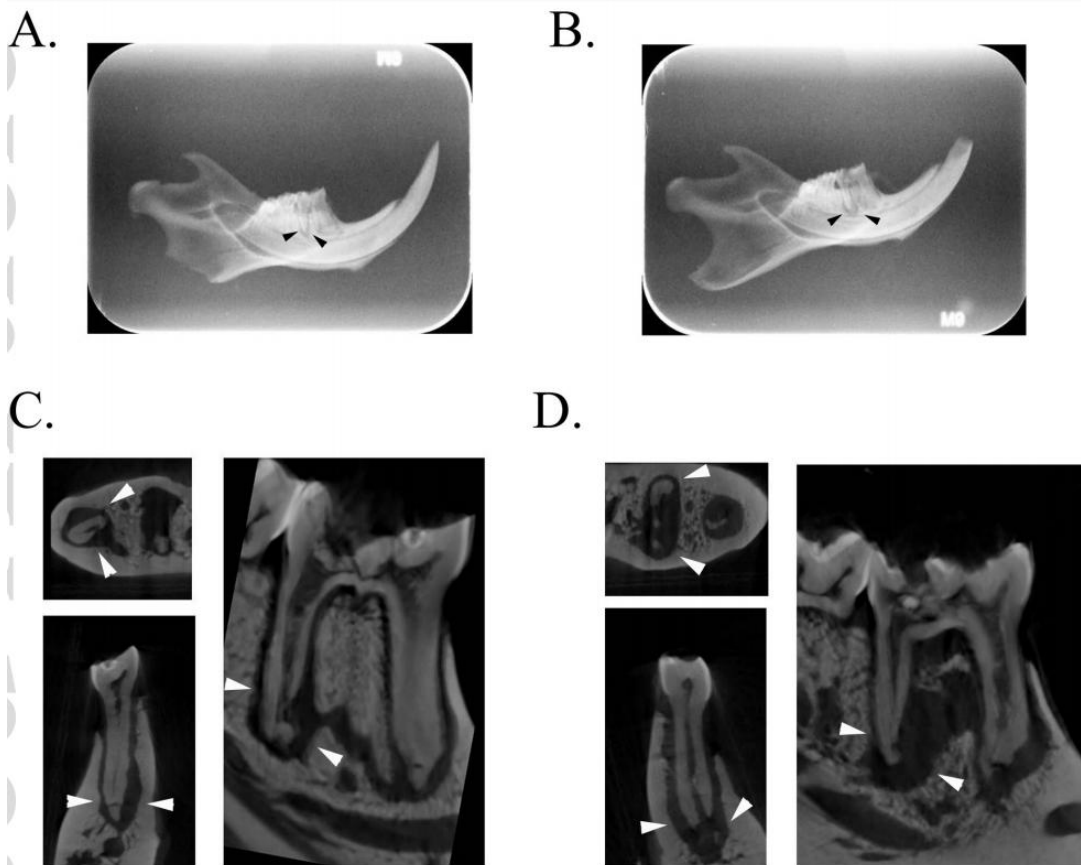


FIGURE 1. Development of induced apical periodontitis in rats. Apical periodontitis was induced in rats by pulp exposure at the distal fossa of right mandibular first molars. The animals were randomly assigned into two groups and sacrificed on day 10 or 30. Representative conventional radiographs and microcomputed tomographs are shown. Arrowheads indicate lesions at the distal root apices of right mandibular first molars. (A) and (C), 10-day specimens; (B) and (D), 30-day specimens

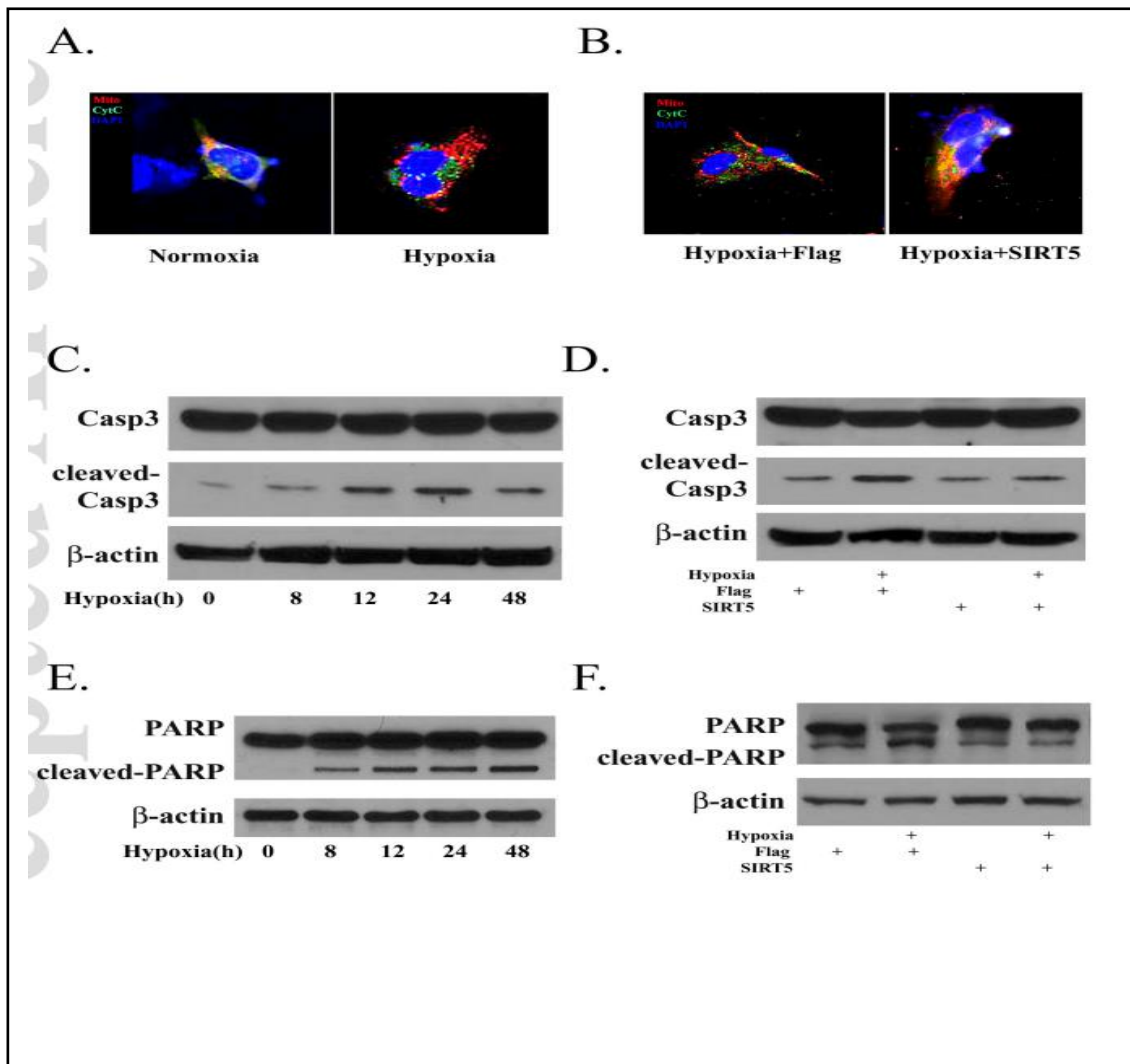


FIGURE 4. SIRT5 repressed hypoxia-induced osteoblast apoptosis. (A) Human osteoblasts were cultured under normoxia or hypoxia (2% O<sub>2</sub>) for 24 h. Immunofluorescence staining for cytochrome c (CytC, green) and confocal imaging was performed. Mitotracker Red (Mito) and DAPI (blue) were used to label mitochondria and nuclei respectively. Accumulation of cytochrome c in mitochondria and leakage of cytochrome c are respectively indicated by orange and green dots. (B) Cells transduced with lentiviral-SIRT5 or empty vector (Flag) were incubated for 24 h under hypoxia. Immunofluorescence staining for cytochrome c, mitochondria and nuclei was conducted. (C) Human osteoblasts were cultured under hypoxia for the indicated time points. Cleavage of caspase-3 was examined by Western analysis. (D) Cells transduced with lentiviral-SIRT5 or empty vector were cultured under hypoxia for 24 h. Cleavage of caspase-3 was examined by Western analysis. (E) Human osteoblasts were cultured under hypoxia for the indicated time points. Fragmentation of PARP was examined by Western analysis. (F) Cells transduced with lentiviral-SIRT5 or empty vector were cultured under hypoxia for 48 h. Fragmentation of PARP was examined by Western analysis.

诱导大鼠根尖周炎的发生。在大鼠右下颌第一磨牙远中窝暴露牙髓诱发根尖周炎（图1）；

人成骨细胞在常氧或低氧（2%O<sub>2</sub>）条件下培养24小时，研究发现低氧可诱导的ROS形成、线粒体去极化、细胞色素c渗漏（图4A）、caspase-3激活（图4C）和PARP碎裂（图4E），SIRT5抑制缺氧诱导的成骨细胞的上述变化（图4B、D、F）。表明SIRT5抑制缺氧诱导的成骨细胞凋亡。



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