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Editorial

New developments in osteoporosis, osteoarthritis and soft tissue repair

The 2024 November issue of JOT brings an exciting review on biomarkers for osteoporosis development and diagnosis [1]. New treatment strategies for osteoporosis are emerging, Yang et al. reported the therapeutic potential of a senolytic compound ABT263 in treating osteoporosis related to Vitamin D insufficiency, by selectively eliminating senescent bone cells [2]. Cheng et al. reported the role of FOX01 in maintaining the role of pericytes, promoting type H vessels formation and blocking FOX01 function is associated with osteoporosis development, FOXO1 may be a new therapeutic target for osteoporosis [3]. Ma et al. reported the use of herbal Zhuanya Jianshen Wan significantly halted osteoporosis development in senile osteoporosis model SAMP6 mice, through regulating PI3K/AKT/Wnt pathways [4].

Porous metal materials have been widely used in orthopedic field for long. Ma et al. reviewed the effects of pore sizes, porosity, material types, coatings etc on bone formation through different cell types, improving healing effects [5]. Lee et al. confirmed that sustained BMP-2 delivery via alginate micro-beds and PCL/B-TCP scaffold enhanced bone formation in long bone segmental defects [6]. Qian et al. reported CD163/TWEAK/Fn14 is a potential therapeutic target for inflammatory bone loss [7]. He et al. reported that a biodegradable magnesium phosphate cement incorporating chitosan and rhBMP-2 repairs bone defect effectively [8]. Miao et al. developed an injectable halloysite nanotubes, which significantly promoted bone formation in bone defect model [9]. Bioactive glass-incorporated with MSCs-derived exosomes significantly promoted bone formation through modulating osteogenesis and inflammation [10]. Heterotopic ossification (HO) in soft tissues is a clinical challenge. Xu et al. found that sensory nerve EP4 and H-type vessels in human HO samples, blocking EP4 expression reduces HO formation in mouse Achilles tendons [11].

On osteoarthritis (OA) front, Su et al. reviewed the roles of ubiquitination and deubiquitylation in chondrocytes, joint aging, inflammation and cartilage ECM degeneration in osteoarthritis development [12]. Fan et al. summarized the possible mechanisms of exosome upregulation in the planar cell polarity, which related to OA progression, adding a new direction for OA pathology [13]. Guo et al. reported that CD73, the rate-limiting enzyme of extracellular adenosine synthesis is positively related to OA development, and may be a new therapeutic target [14]. On the molecular front, Zhang et al. reported the IHH-GL1-HIF2a significantly promote hypertrophic chondrocyte mineralization and exacerbates OA progression, suggesting new targets for OA treatment [15].

Tendinopathy is an age-related disorder with tendon degeneration and dysfunction. Cheng et al. releveled that mitochondrial dysfunction contributing to tendinopathy development, and providing a potential mitochondrial treatment for tendinopathy [16]. Sankova et al. reviewed the recent development in Achilles' tendon repair, risk factors and possible solutions through regenerative medicine approaches [17]. Zhou et al. summarized the role of oxidative stress in intervertebral disc degeneration (IVDD), excessive oxidative stress and reactive oxygen species lead to damage of mitochondria, leading to inflammation and apotosis and disc degeneration [18]. Xue et al. using bioinformatics analysis found that CXCL8 as a potential target gene for IVDD. Macrophage-derived CXCL8 mediated inflammation, oxidative stress and apoptosis in IVDD, which could be a therapeutic target for IVDD [19].

Neuroinflammation plays a crucial role in spinal cord injury (SCI). Chen et al. reported melatonin-pretreated plasma exosomes had enhanced anti-inflammatory function, and significantly improved SCI repair in rat model [20]. Sarcopenia is an emerging muscular degenerative condition with loss of muscle mass, and no effective treatment. Ma et al. reported the use of human umbilical cord MSCs-derived exosomes significantly improved grip strength, increased muscle mass in muscle atrophy mice [21]. Distraction osteogenesis (DO) has been widely used in orthopedics. Lin et al. reported the development of a reproducible mouse DO model which could be used for in-depth mechanistic investigations, using various transgenic mice [22]. Zhang et al. carried out morphological and component analysis of the retrieved plates from repair-surgery, suggested the use of incorporation of Mg + block improves the biomechanical performance and promote bone healing [23]. Finally, Zhao et al. reported using a robot reduction system has significantly improved the clinical outcome for geriatric pelvic fractures [24].

The search for new therapeutic and diagnostic methods for osteoporosis, osteoarthritis, tendinopathy, sarcopenia, disc degeneration and spinal card injuries continue, and will be the main stream research tasks for orthopedic basic and translational research for foreseeable future.

Declaration of competing interest

The authors declare no conflict of interest.

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