~~Innervation by the s~~Sensory nervous system innervation ~~plays a key role in~~is important for skeletal development and ~~in~~ orchestration of bone remodeling and regeneration. However, ~~it is unclear~~ how and in which bone cells ~~can~~ sensory ~~nerves~~ nerves act ~~to~~ for ~~control~~regulating these processes remains unclear. ~~Here~~In this study, we present~~show~~ a microfluidic coculture system involving ~~comprising~~ dorsal root ganglion (DRG) neurons and mesenchymal stem cells (MSCs), which ~~that more faithfully~~ represents the in vivo situation ~~scenario~~ of bone sensory innervation more appropriately. We report that DRG neurons promote the osteogenic differentiation capacity of MSCs~~,~~ by ~~mediating the increase~~ increasing ~~of~~ alkaline phosphatase activity and ~~the~~ upregulati~~on of~~ng osteoblast-specific ~~genes~~gene expression. ~~Furthermore, we show that~~ Further, DRG neurons ~~have a~~ positively impact ~~on~~ Cx43 levels in MSCs during osteoblastogenesis, ~~especially~~ particularly at ~~at~~ an early stage of this process. Conversely, ~~we described a~~DRG neurons negatively impact ~~of DRG neurons on MSCs~~ N-cadherin expression in MSCs at a later stage of the process. Finally, we demonstrate ~~a~~ the cytoplasmic accumulation and nuclear~~of~~ translocation of β-catenin ~~translocation~~ ~~into the nucleus,~~ and the subsequent~~ly~~ l~~L~~ymphoid ~~E~~enhancer- ~~B~~binding ~~F~~factor 1- responsive transcriptional activation of downstream genes in cocultured MSCs. ~~Together, o~~Our study provides strong ~~a robust body of~~ evidence that the osteoblast differentiation potential of MSCs is enhanced ~~the direct interaction of~~when DRG neurons directly interact with MSCs in a bone-like microenvironment ~~leads to an enhancement of osteoblast differentiation potential of MSCs~~. The osteogenic effect of DRG neurons on MSCs is mediated ~~through the~~by regulation of Cx43 and N-cadherin expression and activation of the canonical/β-catenin Wnt signaling pathway.

**Comment [A1]:** Here, the sentence has been revised to clearly indicate that accumulation and translocation of β-catenin are being referred to.

**Comment [A2]:** A compound modifier contains 2 or more words, which act together as one adjective and are connected by hyphens. Hyphens are used with these terms so that their meaning is understood clearly.

**Comment [A3]:** The text alongside has been revised to convey the intended meaning in a more concise manner.