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Generation of induced pluripotent stem (iPS) cells from bone-forming cells

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Osteochondroprogenitors uniquely co-expressing Sox9 and Runx2 with dual differentiation potential to become chondrocytes and osteoblasts is an ideal candidate for cell-based therapy. Therefore, developing approaches to generate sufficient amounts of osteochondroprogenitors for skeletal regenerative medicine are essential. Towards this, we take advantage of a reprogramming approach - induced pluripotent stem (iPS) cells generation using osteoblasts. The selection of osteoblasts is based on the hypothesis that it is originally derived from osteochondroprogenitor lineage and the stochastic events of iPS induction might revert osteoblasts first to their progenitor state before becoming pluripotent. Sox9/Runx2 reporter mice will be generated using their regulatory sequences to drive separate drug selection markers (neomycin and blasticidin) and two fluorescence proteins (eYFP and mCherry) for identification and selection of osteochondroprogenitors during reprogramming.
Our data showed that osteoblasts can be reprogrammed to iPS cells with pluripotency potential as shown by their ability to form teratomas and contribute to chimeric embryos. The system will enable us to test the possibility of “capturing” or enriching for osteochondroprogenitors during the reprogramming process.