

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: *Individual cell borders are complex and dynamic.* Live imaging of mosaic labelling with adenoviral Utr-RFP in wholemount E14.5 skull caps shows complex mesenchymal cell shapes and dynamics.

File Name: Supplementary Movie 2

Description: *Bone expansion ex vivo.* Live imaging of Osx1-GFP::Cre labelled skull caps at E13.75.

File Name: Supplementary Movie 3

Description: *Oriented division are found at the osteogenic front.* Live imaging of E13.75 Osx1-GFP::Cre labelled skull caps.

File Name: Supplementary Movie 4

Description: *Few cellular rearrangements at E13.75.* Tracked nuclei show few neighbor exchanges at osteogenic front in live imaged E13.75 Osx1-GFP::Cre labelled skull caps.

File Name: Supplementary Movie 5

Description: *New differentiation events occur ahead of the osteogenic front.* Live imaging of E13.75 Osx1-GFP::Cre; R26RmTmG reporter mice showing nuclear only label ahead of an osteogenic front labelled with both membrane and nuclear GFP.