

(C) Western blot analysis of lysates from cells transfected with WT, p.Ser55Pro, or empty vector (control) , and probed with ARHGAP29 or GAPDH antibody.

**Supplementary Figure 1. SysFACE-based facial tissue expression and enrichment analysis of *Arhgap29* and previously established CP genes:** Comparative analysis, using SysFACE, of *Arhgap29* and the previously identified human or mouse CP-associated genes *Smad4*, *Bmp4* and *Fgfr2* based on their absolute expression (left) and their enrichment scores (right) in four different developing facial tissue (Mandible, Palate, Frontonasal, and Maxilla). Heatmap indicates that all four genes are enriched in developing palate and early mandible relative to xxx tissue. This analysis also demonstrates high levels of absolute expression between *Arhgap29*, *Smad4*, *Bmp4* and *Fgfr2* in all four facial tissues across several developmental stages, with the expression levels being particularly high for *Arhgap29* and *Smad4*.

**Supplement Figure 2. Evidence of transcription and translation of p.Ser522Pro ARHGAP29 mutant:** (A) Migration experiment for iNHKs transfected with *Arhgap29*siRNA or siCon. (B) Percentage of scratch still open after T24. (C) Western blot showing efficiency of *Arhgap29* knockdown by the siRNA; comparison is to WT, mutant and control siRNA.