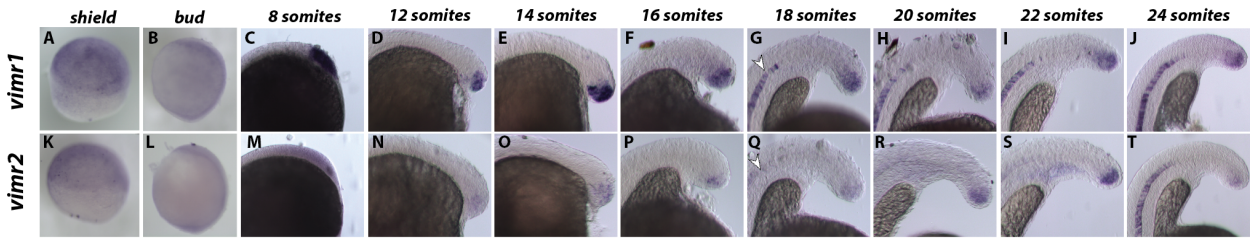
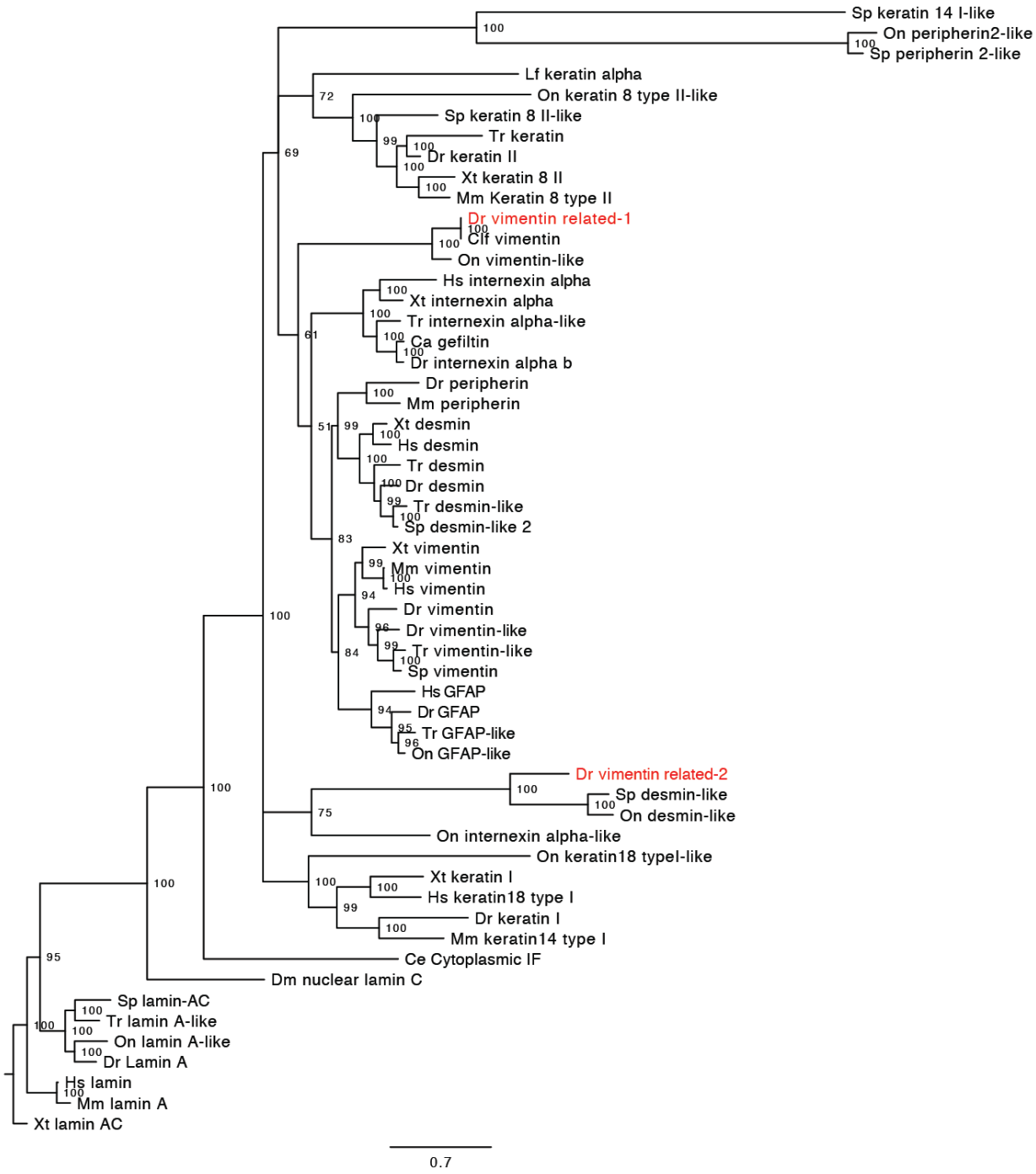


Goto et al. Supplemental Figure 1

Supplemental Figure 1. Time course expression of vimentin related genes

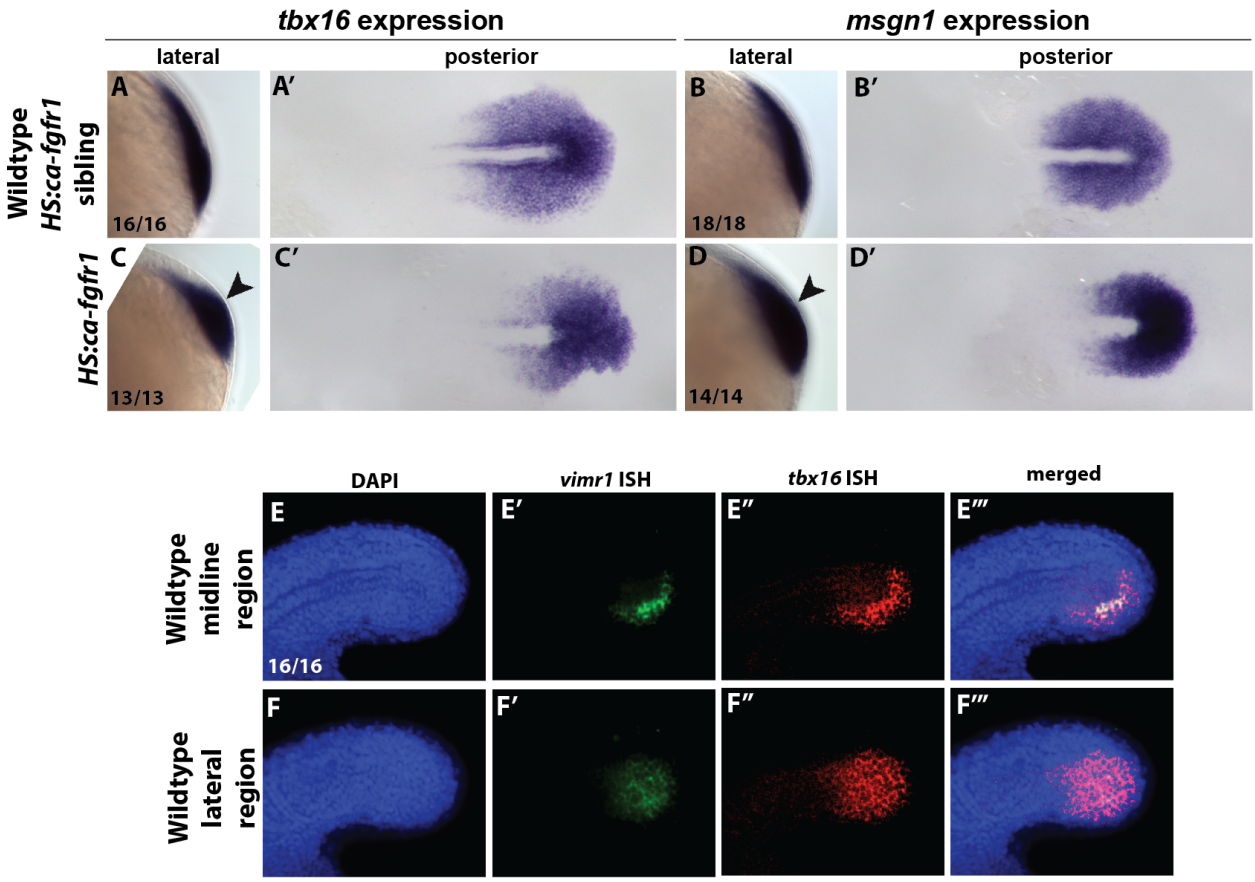
Vimr1 (A-J) and *Vimr2* (K-T) expression in wildtype embryos fixed at different stages. The beginning of notochord expression at the 18-somite stage is indicated by arrowheads (G and Q). Shield staged embryos were taken laterally with the shield towards the right. Embryos from 8-somite stage and onward were taken laterally with anterior towards the bottom.



Goto et al. Supplemental Figure 2

Supplemental Figure 2. Phylogenetic analysis of intermediate filaments

Bayesian phylogenetic analysis of zebrafish vimentin-like genes with other intermediate filaments with laminin genes serving as an outgroup. The numbers at the node specify Bayesian posterior probabilities. Species abbreviations with common names in parentheses: Ca, *Carassius auratus* (goldfish); Ce, *Caenorhabditis elegans* (nematode); Clf, *Canis lupus familiaris* (Dog); Dm, *Drosophila melanogaster* (fruit fly); Dr, *Danio rerio* (Zebrafish); Hs, *Homo sapiens* (human); Lf, *Lampetra fluviatilis* (Lamprey); Mm, *Mus musculus* (mouse); On, *Oreochromis niloticus* (Nile tilapia); Sp, *Stegastes partitus* (bicolor damselfish); Tr, *Takifugu rubripes* (pufferfish); Xt, *Xenopus tropicalis* (frog)



Goto et al. Supplemental Figure 3

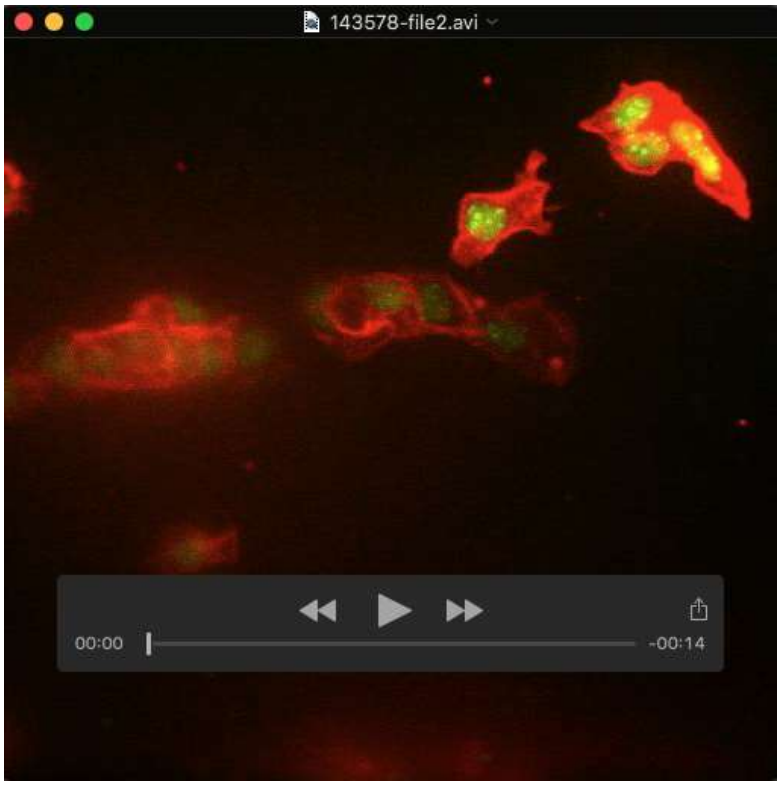
Supplemental Figure 3. Expression of mesodermal maturation genes in FGF overactivated tailbud and expression domains of *vimr1* and *tbx16* in the wildtype tailbud. HS:*cafgfr1* and wildtype embryos were heat-shocked at bud stage and fixed at 8-somite stage to examine the effect of FGF overactivation on maturation gene expression. Overactivation of FGF leads to strong expression of *tbx16* and *msgn1*, which expands into the NMP region (C, C', D, D') compared to the control (A, A', B, B'). Double fluorescent *in situ* hybridization of *tbx16* and *vimr1* ina wild-type 20-somite stage embryo. As the mesodermal progenitors move from the dorsal region to ventral region, the cells turn on *vimr1* and *tbx16* (E, E', E'', E'''). However, as the cells enter the maturation zone in the lateral regions, the cells turn of *vimr1* (F, F', F'', F''').

Table S1. Statistics for time lapse tracking. P values were calculated by Student's t-test. S indicates significant ($p<0.05$), while NS implies nonsignificant ($p>0.05$).

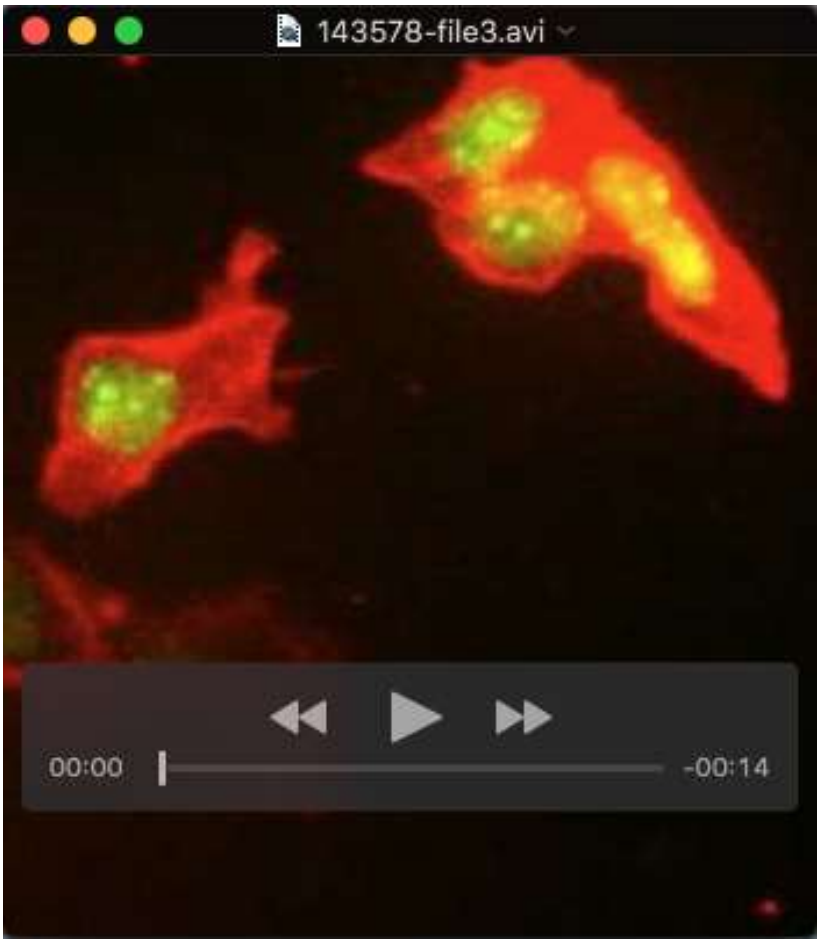
			Displacement		Mean Track Speed		Track straightness	
Embryo	**number of embryos**	**Total tracks**	**P val compared to wildtype-DMSO**	**P val compared to HStbx16-SU5402**	**P val compared to wildtype-DMSO**	**P val compared to HStbx16-SU5402**	**P val compared to wildtype-DMSO**	**P val compared to HStbx16-SU5402**
wildtype-DMSO	**4**	**268**						
HS:tbx16-DMSO	**3**	**177**	p=0.7425; NS	p=0.433; NS	p=0.0323; S	p=0.2539; NS	p=0.1601; NS	p=0.9717; NS
wildtype-SU5402	**3**	**143**	p=0.0323; S	p=0.0073; S	p=0.0073; S	p=0.0151; S	p=0.1886; NS	p=0.1116; NS
HS:tbx16-SU5402	**3**	**223**						
HS:caFGFr1-DMSO	**3**	**169**	p=0.5225; NS		p=0.0065; S		p=0.3332; NS	

Table S2. Raw data of transplanted lineage analysis and statistics. P values were calculated by Fisher's exact test. S indicates significant ($p<0.05$), while NS denotes nonsignificant ($p>0.05$).

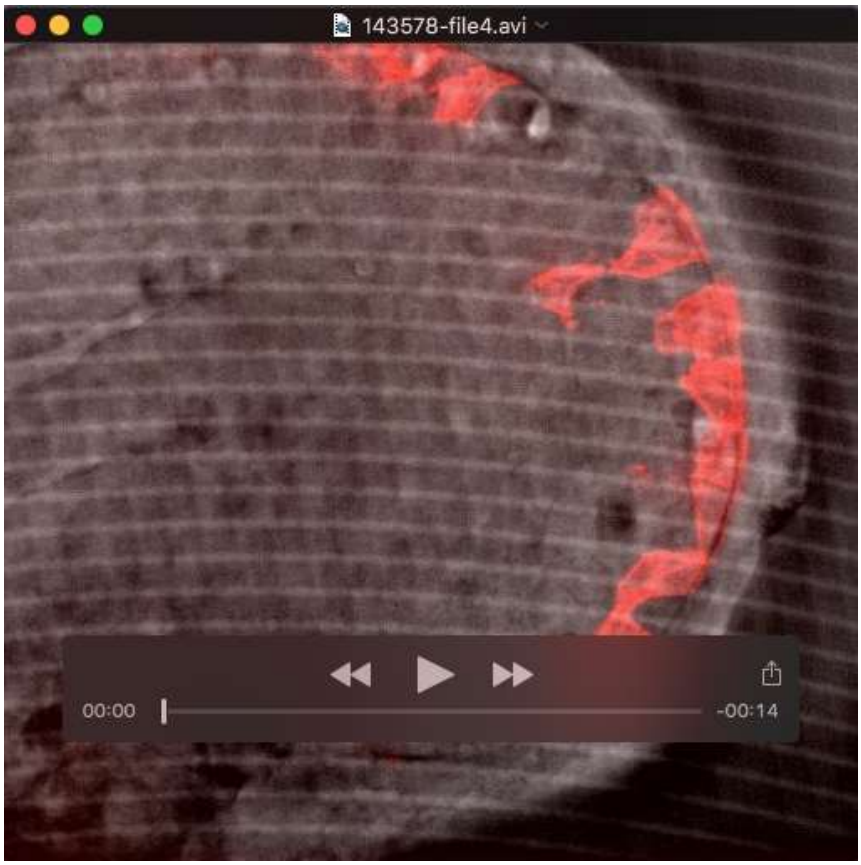
Embryo	number of embryos	Total muscle cells	Total nonmuscle cells	% muscle	% nonmuscle	P val compared to wildtype	P val compared to dnfgf
wildtype	**10**	**167**	**68**	**71.064**	**28.936**		
HS:dnfgfr1	**10**	**33**	**127**	20.625	79.375	p<0.0001; S	
pmsgn1/wildtype	**9**	**234**	**88**	72.671	27.329	p=0.7028; NS	
pmsgn1/HS:dnfgfr1	**10**	**216**	**191**	53.071	46.929	p<0.0001; S	p<0.0001; S
ptbx16/wildtype	**8**	**177**	**96**	64.835	35.165	p=0.153; NS	
ptbx16/HS:dnfgfr1	**9**	**97**	**81**	54.494	45.506	p=0.0006; S	p<0.0001; S



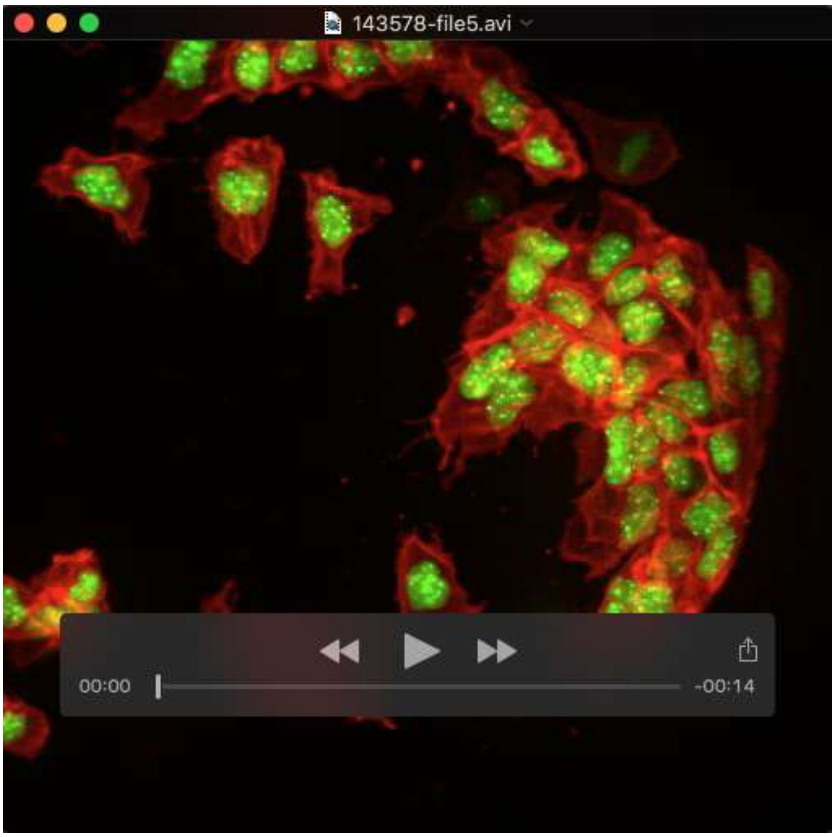
Movie 1. Time lapse movie of transplanted *HS:(CAAX)mCherry-p2a-(NLS)kikume* during the 1st EMT step. Cells of interest are in the upper right of the movie. Images were acquired every 5 minutes for 8 hours.



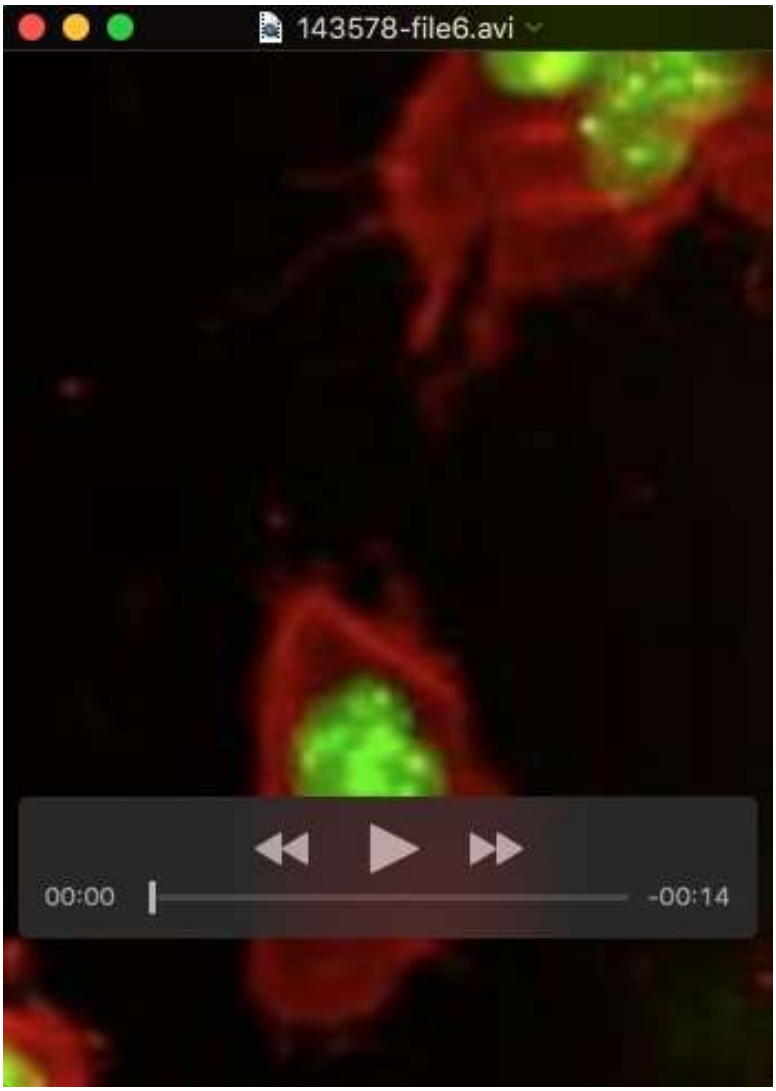
Movie 2. Cropped version of movie 1, focusing on cells of interest.



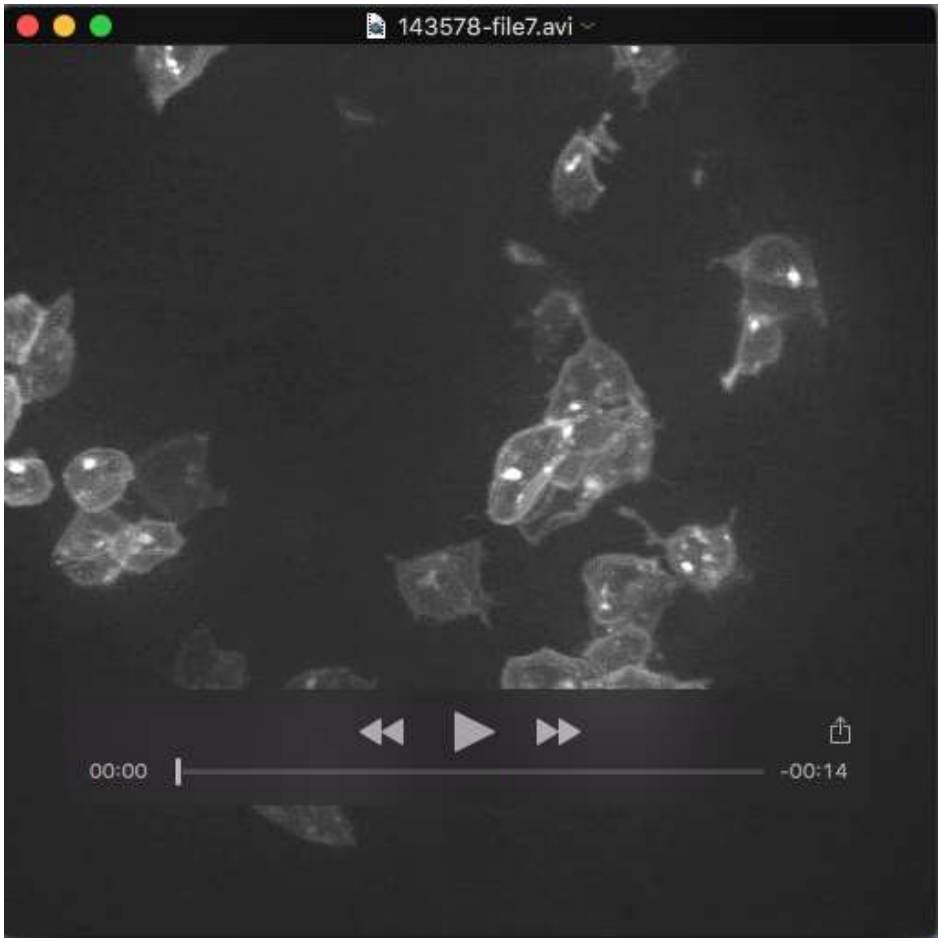
Movie 3. Time lapse movie of transplanted *HS:TCFΔC* cells. . Images were acquired every 5 minutes for 8 hours.



Movie 4. Time lapse movie of transplanted *HS:(CAAX)mCherry-p2a-(NLS)kikume* during the 2nd EMT step. The cell of interest is in the lower left of the movie. . Images were acquired every 5 minutes for 8 hours.

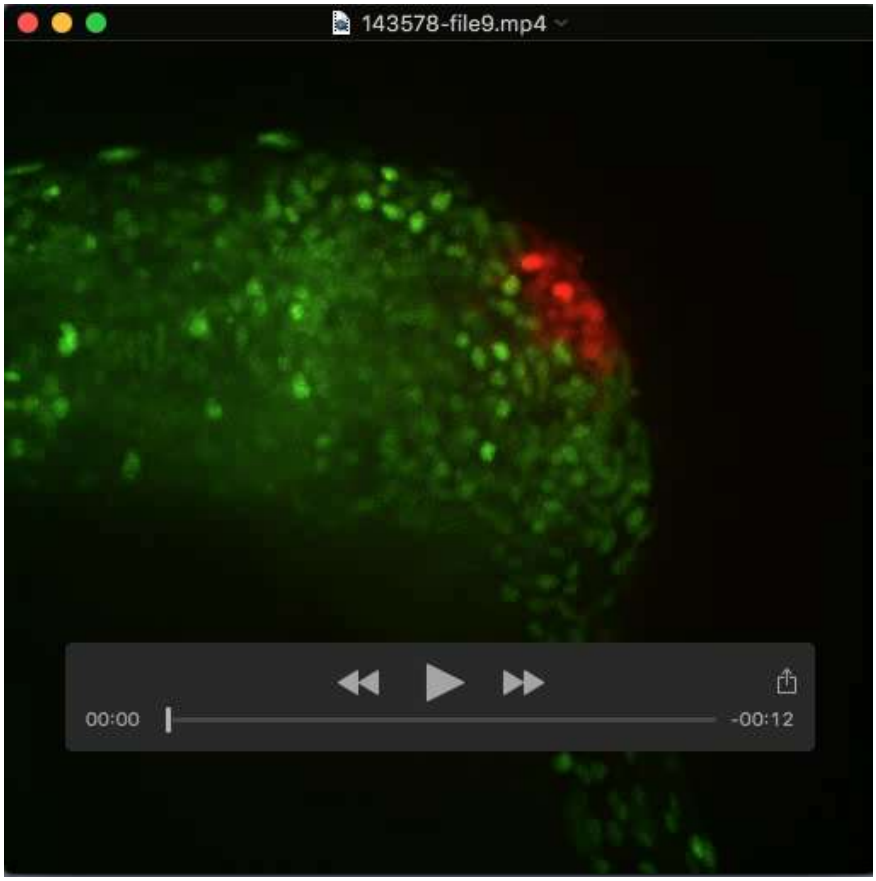


Movie 5. Cropped version of movie 4, focusing on the cell of interest.

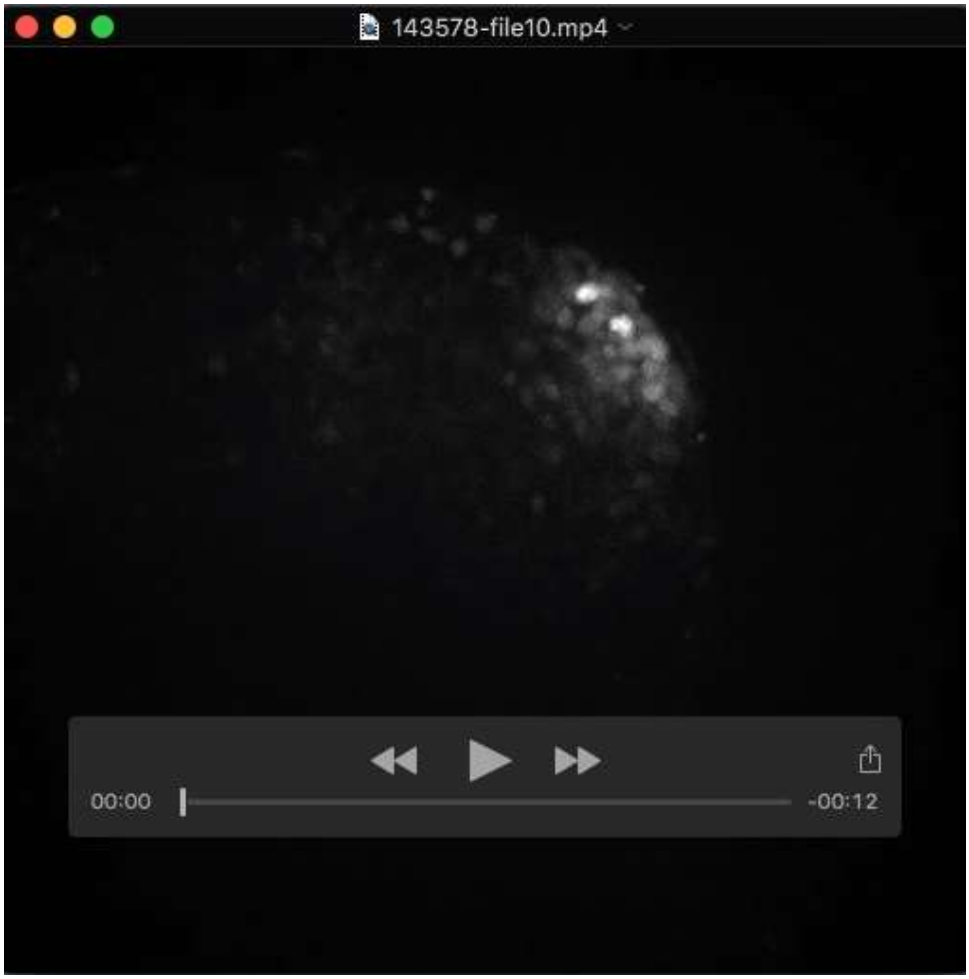


Movie 6. Time lapse movie of transplanted *HS:dnfgfr1* cells. The cell of interest is in the lower left of the movie. . Images were acquired every 5 minutes for 8 hours.

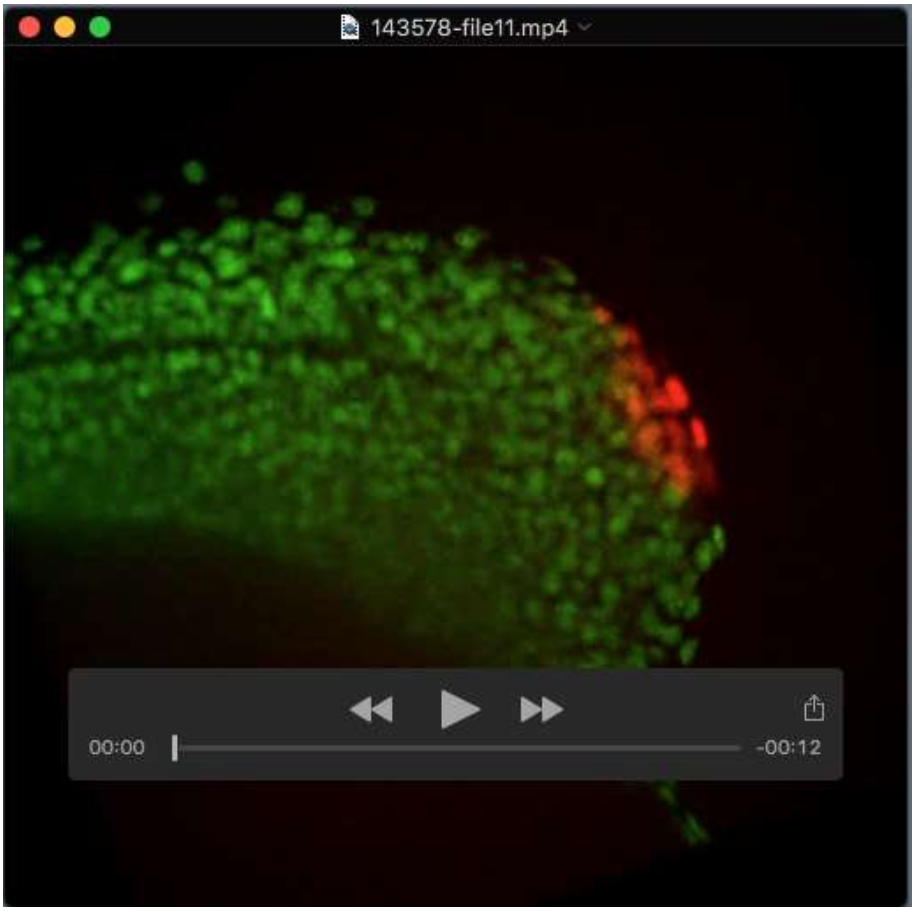
Movie 7. Cropped version of movie 6, focusing on the cell of interest.



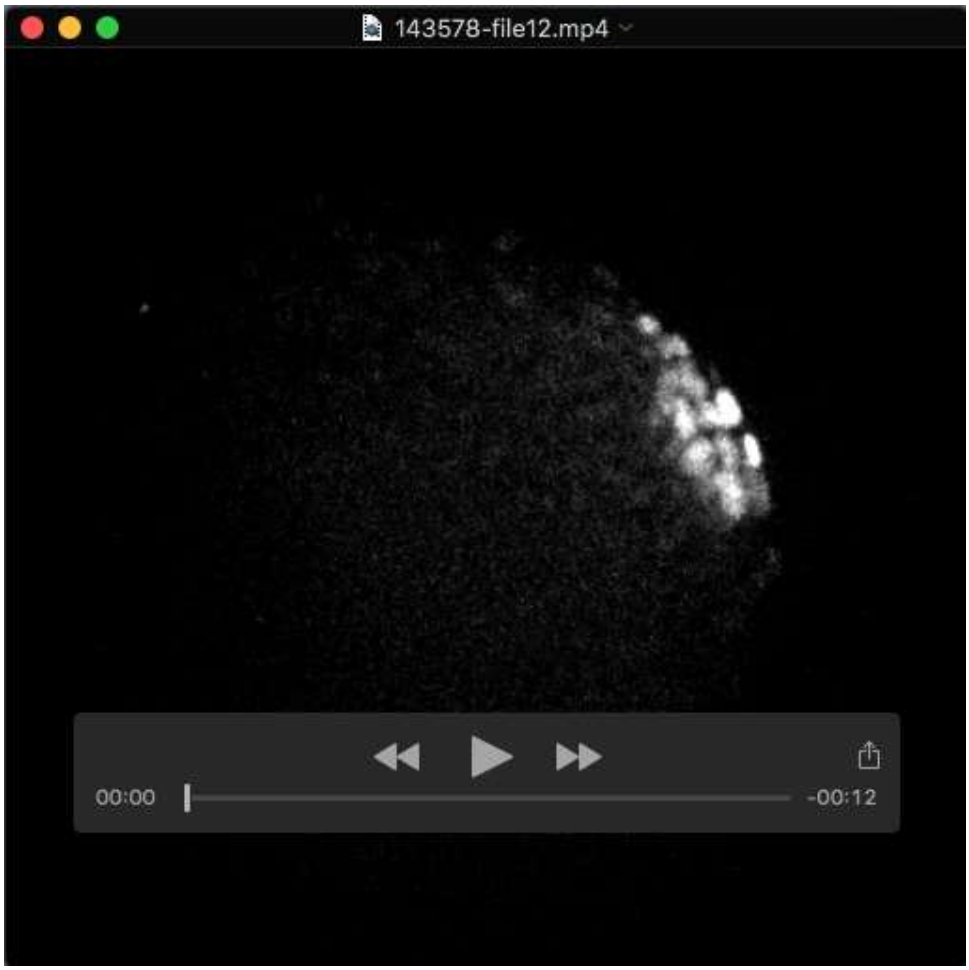
Movie 8. Time lapse movie of photoconverted cells in a wildtype tailbud (merged) A movie of wildtype photoconverted red tailbud cell with Z projection from 5um Z-stacks merged with a projection of nonconverted cells in green. The embryo was treated with DMSO (vehicle). Images were acquired every 5 minutes for 5 hours. (5 frames per second).



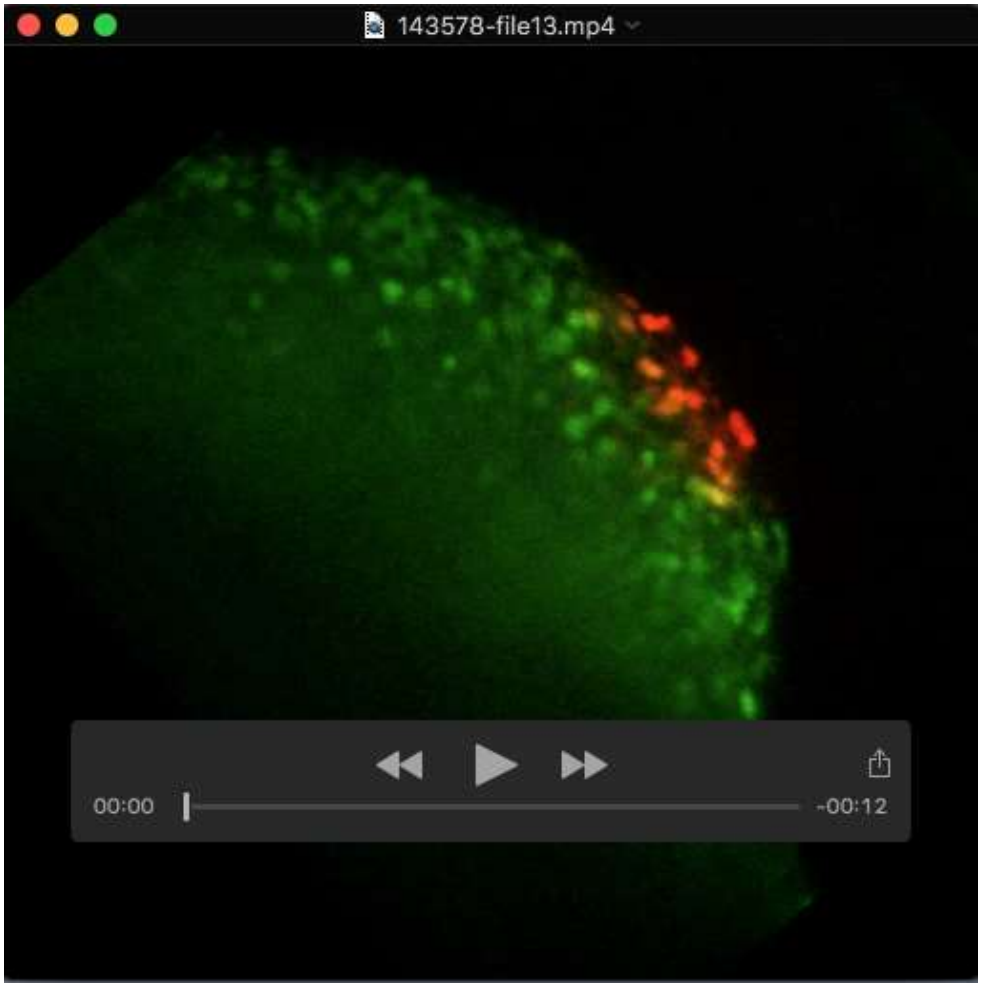
Movie 9. Time lapse movie of photoconverted cells in a wildtype tailbud (photoconverted cells only) A movie of wildtype photoconverted tailbud cell with Z projection from 5um Z-stacks. The embryo was treated with DMSO (vehicle). Images were acquired every 5 minutes for 5 hours. (5 frames per second).



Movie 10. Time lapse movie of photoconverted tbx16 overexpressed progenitors in the tailbud (merged) A movie of HS:tbx16 photoconverted tailbud cells with Z projection from 5um Z-stacks merged with unconverted green field projected plane. The embryo was treated with DMSO (vehicle). Images were acquired every 5 minutes for 5 hours. (5 frames per second).

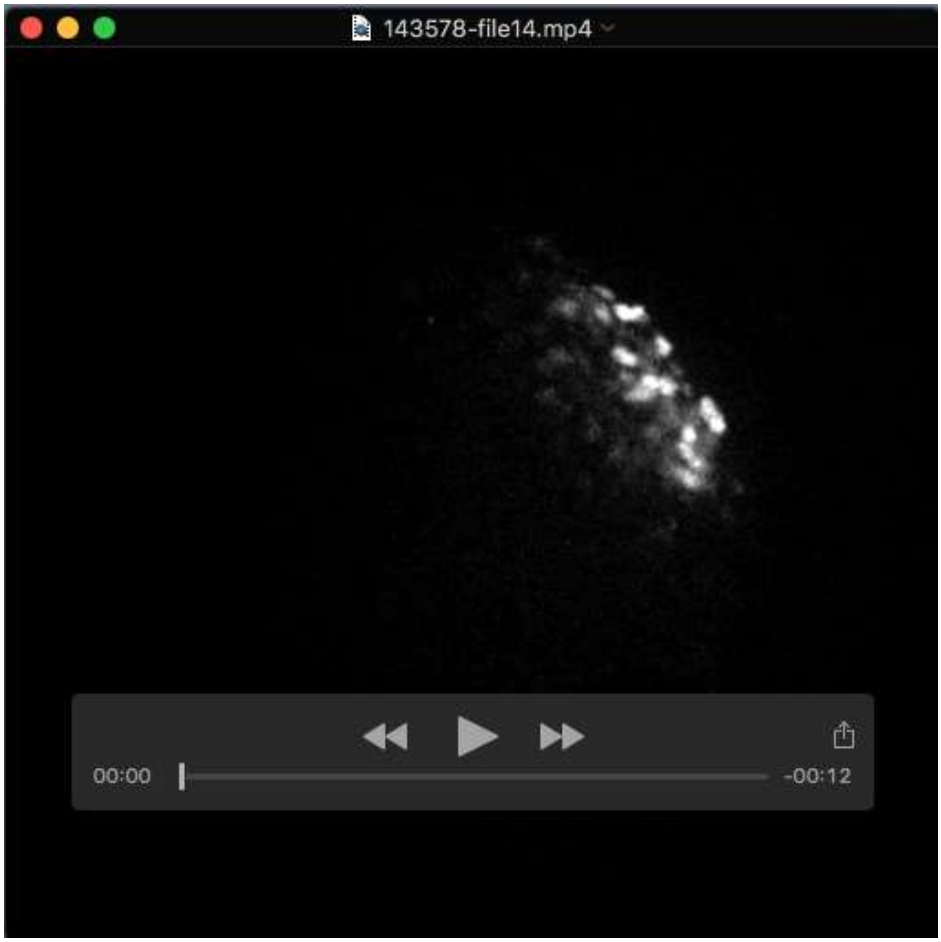


Movie 11. Time lapse movie of photoconverted tbx16 overexpressed progenitors in the tailbud (photoconverted cells only) A movie of DMSO treated HS:tbx16 photoconverted tailbud cells with Z projection from 5um Z-stacks. Images were acquired every 5 minutes for 5 hours. (5 frames per second).

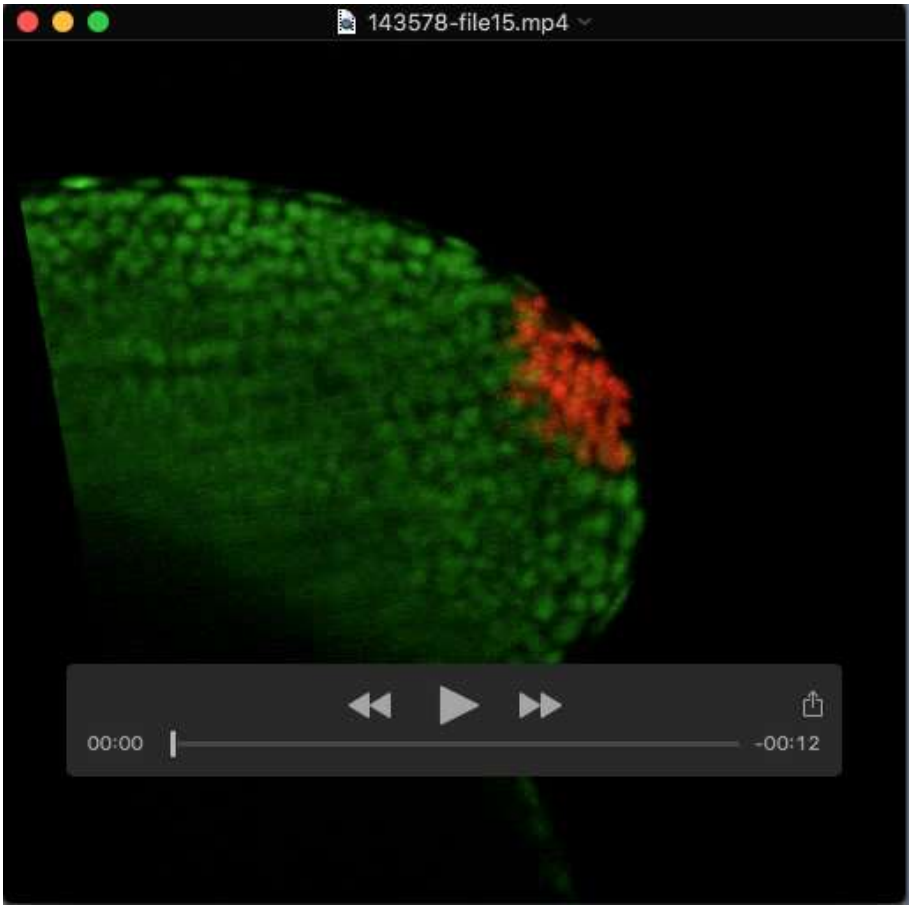


Movie 12. Time lapse of photoconverted FGF inhibited progenitors in the tailbud (merged)

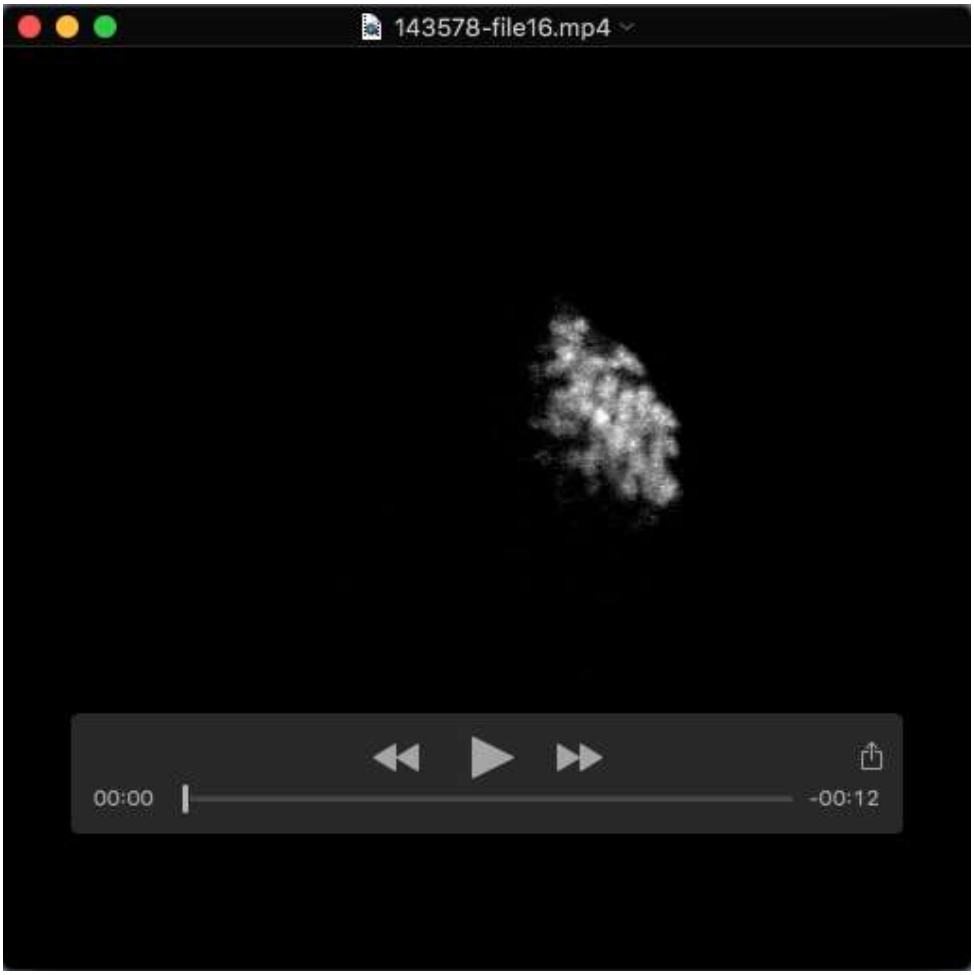
Time lapse movie of SU5402 treated photoconverted tailbud cells with Z projection from 5um Z-stacks merged with a projection of nonconverted cells in green. Images were acquired every 5 minutes for 5 hours. (5 frames per second).



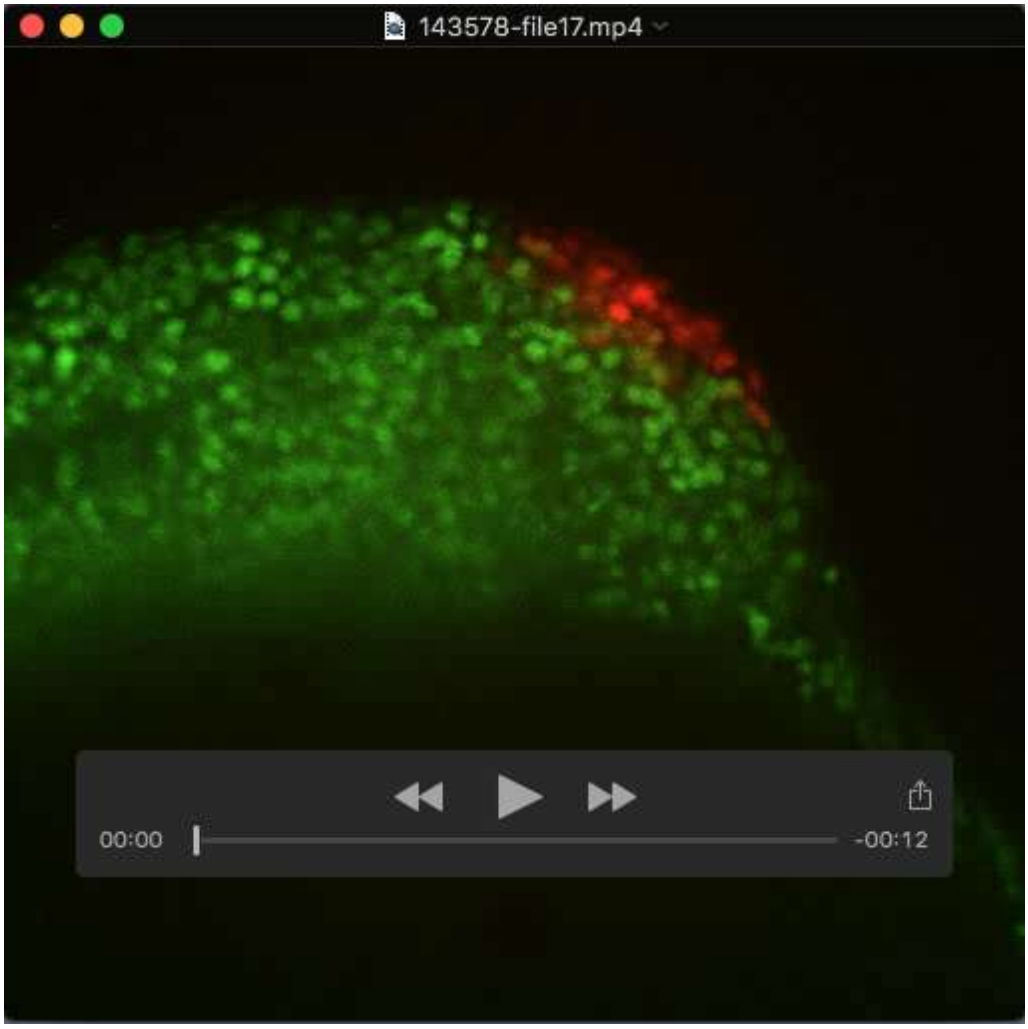
Movie 13. Time lapse of photoconverted FGF inhibited progenitors in the tailbud (photoconverted cells only) Time lapse movie of SU5402 treated photoconverted tailbud cells with Z projection from 5um Z-stacks. Images were acquired every 5 minutes for 5 hours. (5 frames per second).



Movie 14. Time lapse of photoconverted tbx16 overexpressing progenitors in the SU5402 treated tailbud (merged) Time lapse movie of SU5402 treated photoconverted *HS:tbx16* tailbud cells with Z projection from 5um Z-stacks merged with a projection of unconverted green field plane. Images were acquired every 5 minutes for 5 hours. (5 frames per second).



Movie 15. Time lapse of photoconverted tbx16 overexpressing progenitors in the SU5402 treated tailbud (photoconverted cells only) Time lapse movie of SU5402 treated photoconverted nuclei of *HS:tbx16* tailbud cells with Z projection from 5um Z-stacks. Images were acquired every 5 minutes for 5 hours. (5 frames per second).



Movie 16. Time lapse of photoconverted FGF overactivating progenitors in the tailbud (merged) Time lapse movie of DMSO treated photoconverted *HS:caFGFr1* tailbud cells with Z projection from 5um Z-stacks merged with a projection of unconverted nuclei in green. Images were acquired every 5 minutes for 5 hours. (5 frames per second).

Movie 17. Time lapse of photoconverted FGF overactivating progenitors in the tailbud (photoconverted cells only) Time lapse movie of DMSO treated photoconverted *HS:caFGFr1* tailbud cells with Z projection from 5um Z-stacks. Images were acquired every 5 minutes for 5 hours. (5 frames per second).