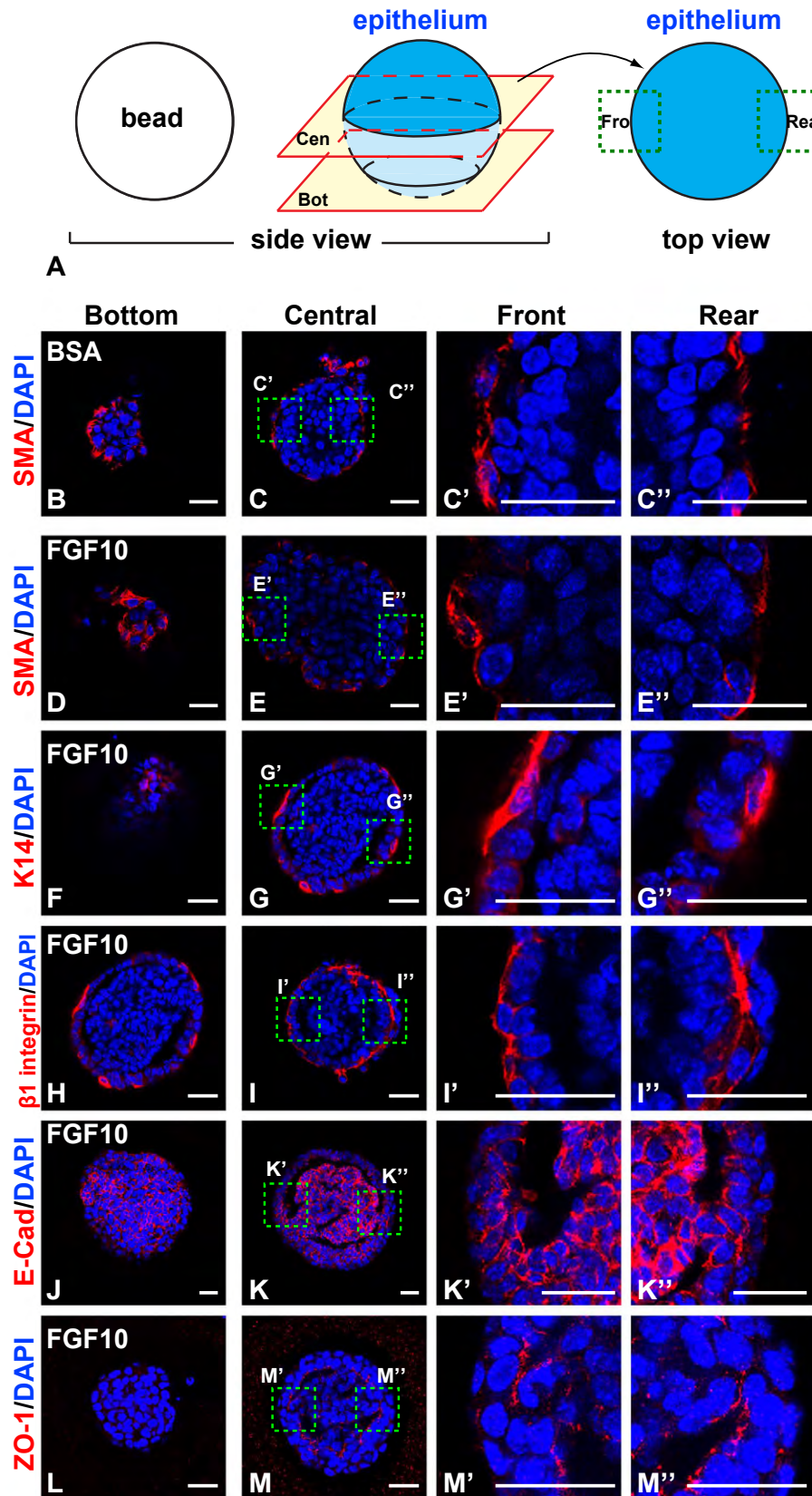


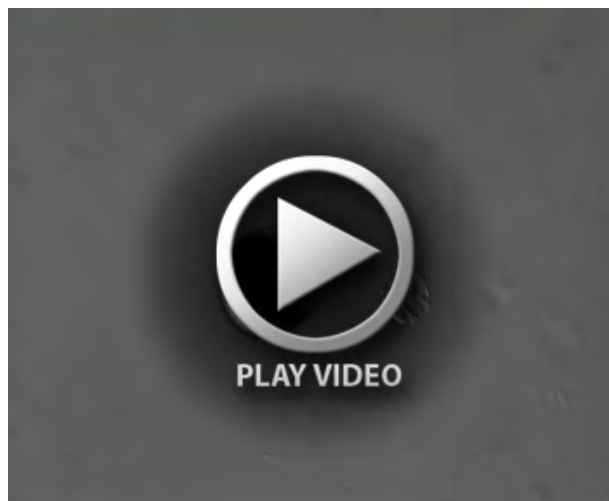
**Figure S1: Directional migration of stratified epithelium is not a result of localized cell death.** (A-J) Cell death as detected by Lysotracker assay (green) during the time course of mammary epithelial migration toward beads soaked in BSA (A-D) or FGF10 (E-H). Cell death was quantified in one of the three evenly divided regions of an organoid, the front (f), middle (m), or rear (r) regions, depending on their distances from the bead (asterisk). Scale bars: 100 $\mu$ m. (I, J) Quantification of cell death in different regions of mammary organoids during epithelial migration. Only signals that overlap with cell bodies were counted as dying cells whereas background noise was discounted. Statistical data were analyzed using two-factorial Analysis of Variance (ANOVA), having time and section of organoid as the two factors.



**Figure S2: Directional migration of stratified epithelium lacks obvious front-rear polarity.** (A) Schematic diagram depicting optical sectioning protocol of the mammary organoid in relation to bead location. Samples were sectioned optically along the Z-axis and images from the bottom (Bot) and central (Cen) are shown in (B-M). The front (Fro) and rear (Rea) areas of the central optical section were further shown in close-up views (C'-M''). (B-M) Immunofluorescence on mammary organoids to detect basal cells using antibodies against SMA (B-C'') and K14 (C-E'') and tissue polarity using antibodies against  $\beta 1$  integrin (H-I''), E-Cadherin (J-K''), and Zo-1 (L-M''). Scale bars: 25  $\mu\text{m}$ .



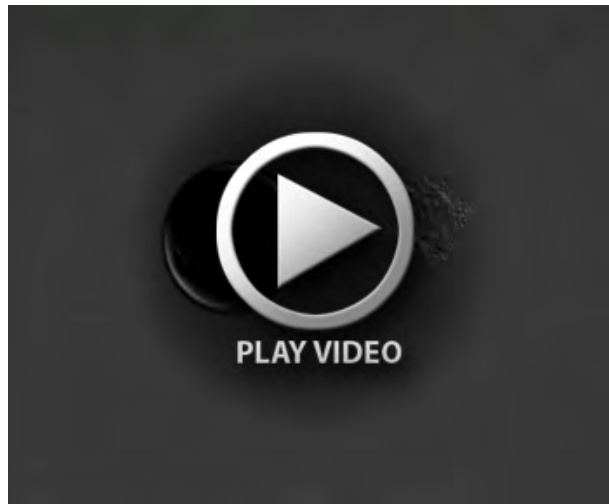
**Movie 1: Time-lapse movie of mammary organoids stimulated by FGF2-soaked beads**



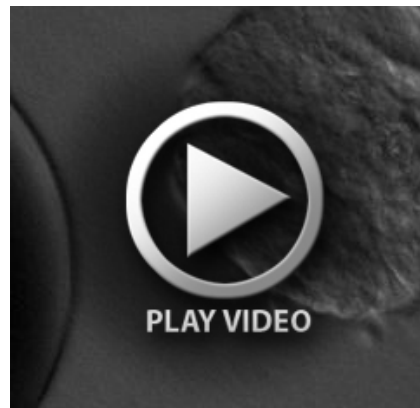
**Movie 2: Time-lapse movie of mammary organoids stimulated by FGF7-soaked beads**



**Movie 3: Time-lapse movie of mammary organoids stimulated by BSA-soaked beads**



**Movie 4: Time-lapse movie of mammary organoids stimulated by FGF10-soaked beads**



**Movie 4': Time-lapse movie of close-up view of mammary collective epithelial migration when stimulated by FGF10-soaked beads**



**Movie 5: High-resolution time-lapse movie of mammary organoids stimulated by FGF10-soaked beads**

**SUPPLEMENTARY TABLE S1: Primers used in qPCR.**

Gene name	Forward sequence (5' → 3')	Reverse sequence (5' → 3')
<i>Fgf1</i>	ggacaccgaagggtttat	gcatgcttctggagggttaa
<i>Fgf2</i>	cggctctactgcaagaacg	tgcttgagttgtagttgacg
<i>Fgf3</i>	tgagaacagcgcctatagca	gtaccgccagaaaagagc
<i>Fgf4</i>	gcaagctcttcggtgtgc	cgtaggattcgtaggcgtg
<i>Fgf5</i>	cgaggagtttcagcaacaaa	tccgtaaattggcacttgc
<i>Fgf6</i>	tcagtggaacacacgaggag	cccgttctaccgtggagat
<i>Fgf7</i>	aagggacccaggagatgaag	actgccacggctctgattt
<i>Fgf8</i>	caggtcctggccaacaag	ggtctccacaatgagcttcg
<i>Fgf9</i>	actgcaggactggatttcattag	ccaggcccactgctatactg
<i>Fgf10</i>	cgggaccaagaatgaagact	aacaactccgatttccactga
<i>Fgf11</i>	ctttgccagaaacagctcct	gcctttgagctgaggctct
<i>Fgf12</i>	gacgaaaacagcgactacacc	tctccattcatggccacata
<i>Fgf13</i>	caggcagatggaaccattg	cccacagggatgagggtaaa
<i>Fgf14</i>	tgctgtacaggcaacaggag	ttctcggtacatggcaacttc
<i>Fgf15</i>	ggcaagatatacgggctgatt	tccatttctccctgaaggt
<i>Fgf16</i>	agtggactctggcctgtaccta	cattcacgtgtgagtttctcg
<i>Fgf17</i>	tatgaacaagaggggcaagc	ctcgggtgaacacgcagtct
<i>Fgf18</i>	aggacggggacaagtatgc	ggacttgactcccgaaggtat
<i>Fgf20</i>	cggcaggatcacagtctctt	aagggtacaggccactgtcca
<i>Fgf21</i>	agatggagctctctatggatcg	gggcttcagactggtacacatt
<i>Fgf22</i>	ctatgtggccatgaatcgc	cggaacctacagtccacagag
<i>Fgf23</i>	atctccacggcaacattttt	gtccactggcggaaacttg
<i>Etv5</i>	aggaccccaggctgtacttt	tggccgattcttctggatac
<i>K8</i>	atcgagatcaccacctaccg	tgaagccagggtctagtgagt
<i>K18</i>	agatgacaccaacatcacaagg	tccagaccttgacttctc
<i>Notch1</i>	acaacaacgagtgtgagtcc	acacgtggctcctgtatatg
<i>Hes6</i>	gctgctctcgtttgtaacaca	cgatgggatggcaaccaa
<i>Gata3</i>	agccacatctctcccttcag	agggctctgcctcttaacc
<i>K14</i>	atcgaggacctgaagagcaa	ggctctcaatctgcatctcc
<i>p63</i>	ggatgatttgcaagtctga	acttggggtctcaggagat
<i>Mmp2</i>	taacctggatgccgtcgt	ttcaggttaataagcacctttaa
<i>Mmp3</i>	ttgttctttgatgcagtcagc	gatttgcgcaaaaagtgc
<i>Mmp14</i>	gagaacttcgtgttgcctga	ctttgtgggtgaccctgact

<i>Actb</i>	ggctgtattccctccatg	ccagttggaacaatgcatgt
<i>18S</i>	gtaaccggtgaacccatt	gtaaccggtgaacccatt
<i>EEF1g</i>	ggattctgtgtttgagagca	cagcaaagetgaccactg
<i>GAPDH</i>	ttcaccacatggagaaggc	ccctttggctccacct

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**SUPPLEMENTARY TABLE S2. Effects of MEK inhibitor (U0126) and PI3K inhibitor (LY294002), alone or in combination, on migration of mammary epithelium when stimulated by beads soaked in FGF10.**

U0126 [ $\mu$ M]	LY294002 [ $\mu$ M]	Complete migration	Partial migration	No migration	Numbers tested
2.0	0	0	2	3	5
1.3	0	4	0	0	4
1.0	0	3	0	1	4
0	200.0	0	0	9	9
0	20.0	0	0	6	6
0	13.3	0	0	4	4
0	10.0	1	1	2	4
0	5.0	2	0	2	4
0	3.3	4	0	0	4
2.0	3.0	0	3	0	3
2.0	5.0	0	3	1	4
1.3	13.3	0	0	3	3
1.3	10.0	0	0	7	7
1.3	5.0	0	2	2	4
1.3	3.3	0	3	1	4