**Supplemental Methods**

***Retroviral Infections***

Retroviral plasmids were packaged in 293 GP2 cells (Clontech) using the VSVG (vesicular stomatitis virus glycoprotein) packaging plasmid and PEI (Polyethylenimine; Sigma Aldrich) transfection reagent. MDA-MB-134 cells were infected 3 times with virus filtered through 0.45 μm filters in the presence of Polybrene (4 μg/ml; Sigma Aldrich).

***Soft Agar Assays***

Cells were trypsinized, counted and re-suspended in an enhanced media containing 20% serum (CSS for SUM44 cells and FBS for all remaining cell lines) and 2% Nonessential Amino Acids. 1.2% agar stock was prepared by dissolving Bacto-Agar (BD Biosciences) in water and autoclaving. 0.6% agar was laid at the bottom of 35-mm dishes by diluting the 1.2% agar stock 1:1 with enhanced media. After the bottom layers solidified, cells were seeded on top in 0.4% agar in enhanced media.­ Dishes were kept in the incubator in a modified humidifier chamber inside a 15 cm plate with an uncapped dish of water in the middle, which was replenished every few days. Colonies were stained with 0.005% Crystal Violet and imaged on an Olympus IX83 inverted microscope.

***3D ECM Assays***

Cells were trypsinized, counted and pelleted in eppendorf tubes. For Collagen I culture, the following ice-cold reagents were added to the cells on ice in the following order: 10X PBS, 1N NaOH, water and acid-extracted high concentration rat-tail Collagen I (Corning Life Sciences) at a final concentration of 4 mg/ml. The contents of the tubes were gently mix avoiding air bubbles and dispensed carefully into one well of a 24-well plate. After seeding of all cells as biological triplicates, the plate was solidified in the 37°C incubator for 1 hour. 1ml media containing 1X Pen/Strep was placed on top and replenished every 3-4 days. For Matrigel embedded culture, cells were re-suspended in 50 μl of growth factor reduced Matrigel (BD Biosciences) and seeded into 8-well LabTek Chamber Slides (Thermo Fisher Scientific). After solidifying in the 37°C incubator for 1 hour, 400 μl of media containing 1X Pen/Strep was added on top and replenished every 3-4 days. For Matrigel on-top culture, 50 μl of Matrigel was first solidified in each well of the chamber slides. Cells were plated on top in media containing 1X Pen/Strep and 2% Matrigel, which was replenished every 3-4 days.

***ECM adhesion assays***

For ECM adhesion assays, Corning BioCoat Cellware 96-well plates were used with the following catalog numbers: Collagen I (#354407), Collagen IV (#354429), Fibronectin (#354409), Laminin (#354410), Matrigel (#354607). Plates were rehydrated by incubating with 100 μl of PBS at room temperature for 20 minutes. In addition, extra plates were included by coating with 1% BSA at room temperature for 1 hour. ILC cells were plated at 100,000/well for the 16-hour incubation and at 200,000/well for the 2-hour incubation. IDC cells were seeded at 50,000/well for the 16-hour incubation and at 10,000/well for the 2-hour incubation.

***Migration and Invasion Assays***

For wound scratch assays, the number of cells for each cell line required to form a monolayer in 96-well plates overnight was first optimized. MDA-MB-134: 175,000/well; SUM44: 125,000/well; MDA-MB-330: 150,000/well; BCK4: 200,000/well; MCF7: 80,000; T47D: 60,000/well; MDA-MB-231: 50,000/well. Cells were plated in ImageLock plates (Essen Bioscience) coated with a thin layer of Matrigel for 2 hours. After the cells adhere overnight, wounds were made using the automated WoundMaker (Essen Bioscience) and plates were washed carefully to remove detached cells. Plates were incubated in the IncuCyte Zoom Live Cell Imaging System (Essen Bioscience). Screen shots and wound density measurements were exported after applying wound density masks using the accompanying wound scratch module of the system.

For transwell Boyden experiments, chemotaxis to FBS was assayed using 8μm hanging inserts in 24-well plates (Thermo Fisher Scientific). For Collagen I haptotaxis experiments, QCM Haptotaxis Cell Migration Assay (ECM582; EMD Millipore) was used. For Collagen I invasion experiments, QCM Collagen Cell Invasion Assay (ECM 552; EMD Millipore) and CytoSelect 24-well Collagen Cell Invasion Assay (CBA-110-COL) were used. For Matrigel invasion experiments, QCM ECMatrix Cell Invasion Assay (ECM554; EMD Millipore) was used. For non-crosslinked Collagen I amoeboid invasion experiments, High Sensitivity Cell Invasion Assay (ECM1401; EMD Millipore) was used. Cells were washed twice with serum free media and serum-starved overnight. Cells were detached using PBS containing 2mM EDTA and neutralized with sterilized serum free media containing 5% BSA as per manufacturer’s recommendations. Cells were counted and seeded at 250,000-300,000/well in the respective inserts in 24-well plates in 300 μl of serum free media. The bottom chambers were filled with 500 μl of media containing no serum or 10% serum (CSS for SUM44 and FBS for all the other cell lines). For haptotaxis experiments, all bottom chambers were filled with serum free media (for both BSA and Collagen I inserts). Cells were incubated for 72 hours, after which the excess cells were removed from the top chambers using a micropipette and flattened cotton swabs. Inserts were stained with Crystal Violet, imaged on an Olympus SZX16 dissected microscope, de-stained and quantified by spectrophotometry at 540nm.