**Supplementary figure legends**

**Supplementary figure 1. Figure 1. *In vivo* model of spontaneous human breast cancer metastasis to human bone implants.** (a)A diagrammatic representation of the mouse model of human breast cancer metastasis to human bone. In this model, two 0.5cm3piecesof human femoral bone were implanted sub-cutaneously into 8-week old female NOD SCID mice. 4-weeks later luciferase expressing MDA-MB-231-luc2-TdTomato, MCF7 or T47D cells were injected into the hind mammary fat pads and mice analysed for metastasis to the human bone implants after 8-10 weeks. (b) shows percentage of mice with detectable metastases in human bone implants and to mouse hind limbs. Data are presented as mean +/- SEM from three separate experiments.

**Supplementary figure 2. Stable transfection of breast cancer cells with IL-1B.** MDA-MB-231, MCF7 and T47D breast cancer cells were stably transfected with IL-1B using a human cDNA ORF plasmid with a C-terminal GFP tag or with a control plasmid. Panel a) shows pg/ng IL-1B protein from IL-1B+ tumor cell lysates compared with scramble sequence control. Panel b) shows pg/ml of secreted IL-1B from 10,000 IL-1B+ and control cells as measured by ELISA. Data shown are presented as mean +/- SEM, \* = P < 0.01, \*\* = P < 0.001, \*\*\* = P < 0.0001 compared with scramble sequence control.

**Supplementary figure 3. Incubation with high concentrations of exogenous IL-1B modestly increases tumor cell migration and invasion.** Effects of adding 20pg/ml, 40pg/ml, 5ng/ml IL-1B or 5ng/ml IL-1B and 50uM IL-1Ra to MDA-MB-231 and T47D cells in culture on migration and invasion through matrigel towards osteoblasts are shown in (a) and on ability to migrate into a scratch are shown in (b). Data are presented as mean +/- SEM, \* = P < 0.01, \*\* = P < 0.001, \*\*\* = P < 0.0001.

**Supplementary figure 4.**  a) Female NOD-SCID mice bearing two-0.5cm3 pieces of human femoral bone received intra-mammary injections of MDA-MB-231Luc2-TdTomato cells. Starting 1-week after tumor cell injection, mice were treated with 1mg/kg/day IL-1Ra, 20mg/kg/14-days Canakinumab, or placebo (control) (n=10/group). All animals were culled 8 weeks following tumor cell injection and Td tomato positive tumor cells detected in whole blood of control mice and mice by flow cytometric analysis\* = P < 0.01, \*\* = P < 0.001, \*\*\* = P < 0.0001.

**Supplementary figure 5. Suppression of IL-1 signalling affects bone integrity and vasculature.** Tibiae and serum from mice that do not express IL-1R1 (IL-1R1 KO), BALB/c nude mice treated daily with the 1mg/kg/day of IL-1R antagonist for 21 and 31 days and C57BL/6 mice treated with 10mg/kg of the anti-IL-1B antibody Canakinumab of 0-96h were analysed for bone integrity by uCT and vasculature-associated molecules using ELISAs for Endothelin 1 and pan VEGF. Panel a) shows the effects of IL-1R1 KO; b) effects of Anakinra and c) effects of Canakinumab on bone volume compared with tissue volume (i), concentration of Endothelin 1 (ii) and VEGF (iii) secreted into the serum. Data are presented as mean +/- SEM, \* = P < 0.01, \*\* = P < 0.001, \*\*\* = P < 0.0001 compared with control.

**Supplementary figure 6. Effects of IL-1B on osteoclast and osteoblast activity *in vivo.*** Panel a) shows uCT images of trabecular bone and % of bone volume compared to total tissue volume in the trabecular region of control (IL-1R1 fl/fl) mice compared with IL-1R1 KO mice. Activity of osteoclasts and osteoblasts were measured by detecting TRAPc and P1NP, respectively, in mouse serum by ELISA. Panel b) shows osteoclast and osteoblast activity in control and IL-1R1 KO mice. Panel c) shows the effects of daily administration of IL-1ra or administration of Canakinumab every 14 days for 8 weeks on osteoclast and osteoblast activity in NOD SCID mice 8 weeks after implantation of human bone. Panel d) shows the effects of control or MDA-MB-231 IL-1B + cells in bone on osteoclast and osteoblast activity in BALB/c nude mice. Data are presented as mean +/- SEM, \* = P < 0.01, \*\* = P < 0.001, \*\*\* = P < 0.0001 compared with control.

**Supplementary figure 7. Summary of the effects of IL-1B on breast cancer progression to metastasis and growth in the bone microenvironment.**

**Supplementary table 1. Tumor-derived IL-1B predicts distant recurrence and relapse in bone in patients with stage II and III breast cancer.** Primary tumor samples from >1000 patients with stage II and III breast cancer that had no evidence of metastasis at time of biopsy were stained for IL-1B and IL-1R1. Samples were scored separately for IL-1B in the tumor (a), IL-1B in the stroma (b), IL-1R1 in the tumor (c) and IL-1R1 in the stroma (d).