Supplementary Figure Legends

Supplementary Figure S1. Genotyping of Mmp1a-knockout offspring from heterozygote crosses in C57BL/6 mice. *(a)* PCR based genotyping of 21 day old pups born from heterozygote parents with the Mmp1a-knockout allele (back-crossed 10 generations into the C57BL/6 strain). Agarose gel (2%) showing the Mmp1a wild-type (200 bp amplicon) or knockout allele (470 bp amplicon). *(b)* Number of wild type, heterozygote, and knockout offspring from heterozygote crosses. P value was calculated by Chi-squared test. *(c)* Mmp1a immunofluorescence of *Mmp1a*$^{+/+}$ (WT) or *Mmp1a*$^{-/-}$ (KO) MEFs using either FITC-secondary Ab alone (top panels) or Mmp1a antibody (bottom panels) at 1:20 dilutions, counterstained with DAPI (blue nuclei).

Supplementary Figure S2. Effect of Mmp1a-deficiency on experimental metastasis of LLC1 cells to lung. 1x10^6 LLC1 cells were directly inoculated into the venous circulation by tail vein injection in 6-8 week old female Mmp1a$^{+/+}$ (WT) or Mmp1a$^{-/-}$ (KO) mice. Lungs were harvested 28 d later. Data shown are total number of metastatic nodules from H&E coronal sections at three different depths.

Supplementary Figure S3. Recombinant Mmp1a reconstitutes media from Mmp1a-deficient MEFs in endothelial tube formation assays. HUVECs were assessed for tube formation following 5 h exposure to *Mmp1a*$^{+/+}$ (WT) or *Mmp1a*-deficient (KO) MEF conditioned media with or without purified recombinant Mmp1a protein (20 nM). *(a)*

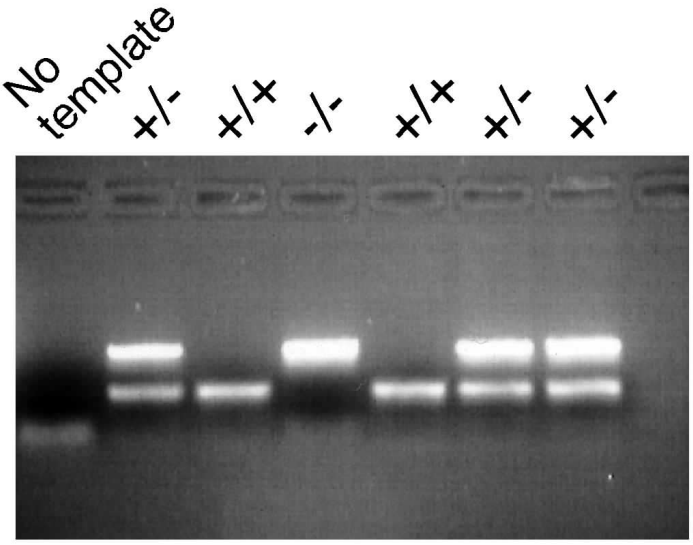
Representative micrographs and (*b*) quantification of average tubal length. Data shown are mean SEM * $p<0.05$, ** $p<0.005$ by ANOVA/SNK

Supplementary Figure S4. Mmp1a cleaves PAR1. N-terminal exodomain cleavage of T7-PAR1 by thrombin (10 nM), or affinity purified His-tagged human MMP1 (10 nM) or Mmp1a (10 nM). Cleavage was measured by loss of the N-terminal T7 epitope from PAR1 expressed on the surface of Cos7 cells over 30 min as measured by flow cytometry.

Supplementary Figure S5. Heterologous expression and secretion of the mouse collagenases. *(a)* Western blot analysis (Myc-Ab) of conditioned media (40 µl per lane) from cell lines (HEK293T, CHOK1, COS7) that were transiently transfected with the mouse collagenases Mmp1a, Mmp1b, Mmp8, Mmp13 and human MMP1. All MMPs were tagged at the C-terminus with a Myc-tag. *(b)* Semi-quantitative PCR of cDNA generated from MMP1, Mmp1a, or Mmp1b transfected HEK293T cells using a universal primer for the tagged region in the transcript of the transfected gene (pCMV6, 75 nt amplicon) or control (actin, 225 nt amplicon). *(c)* Western blot analysis (Myc-Ab) of conditioned media (40 µl) from HEK293T cells transiently transfected with a signal peptide chimera construct P2S Mmp1a. *(d)* Time course western blot analysis (Myc-Ab) of hMMP1 or Mmp1a transfected HEK293T cell lysates following treatment with cycloheximide (10 µg/mL) after 24 h transfection (time 0) to inhibit protein synthesis. pro- prodomain, act- activated enzyme, hpx- C-terminal hemopexin domain.

Supplementary Figure S1

A



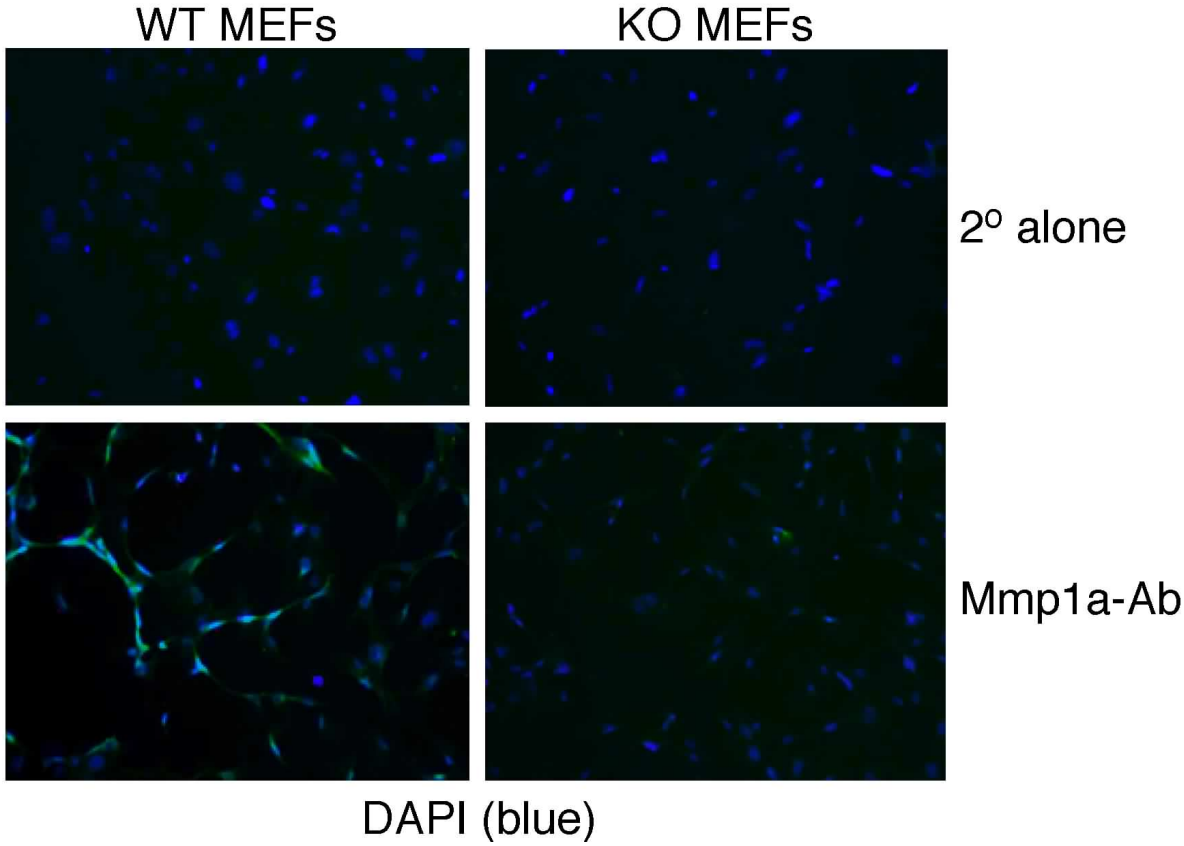
B

10 generation back-crossed C57/BL6

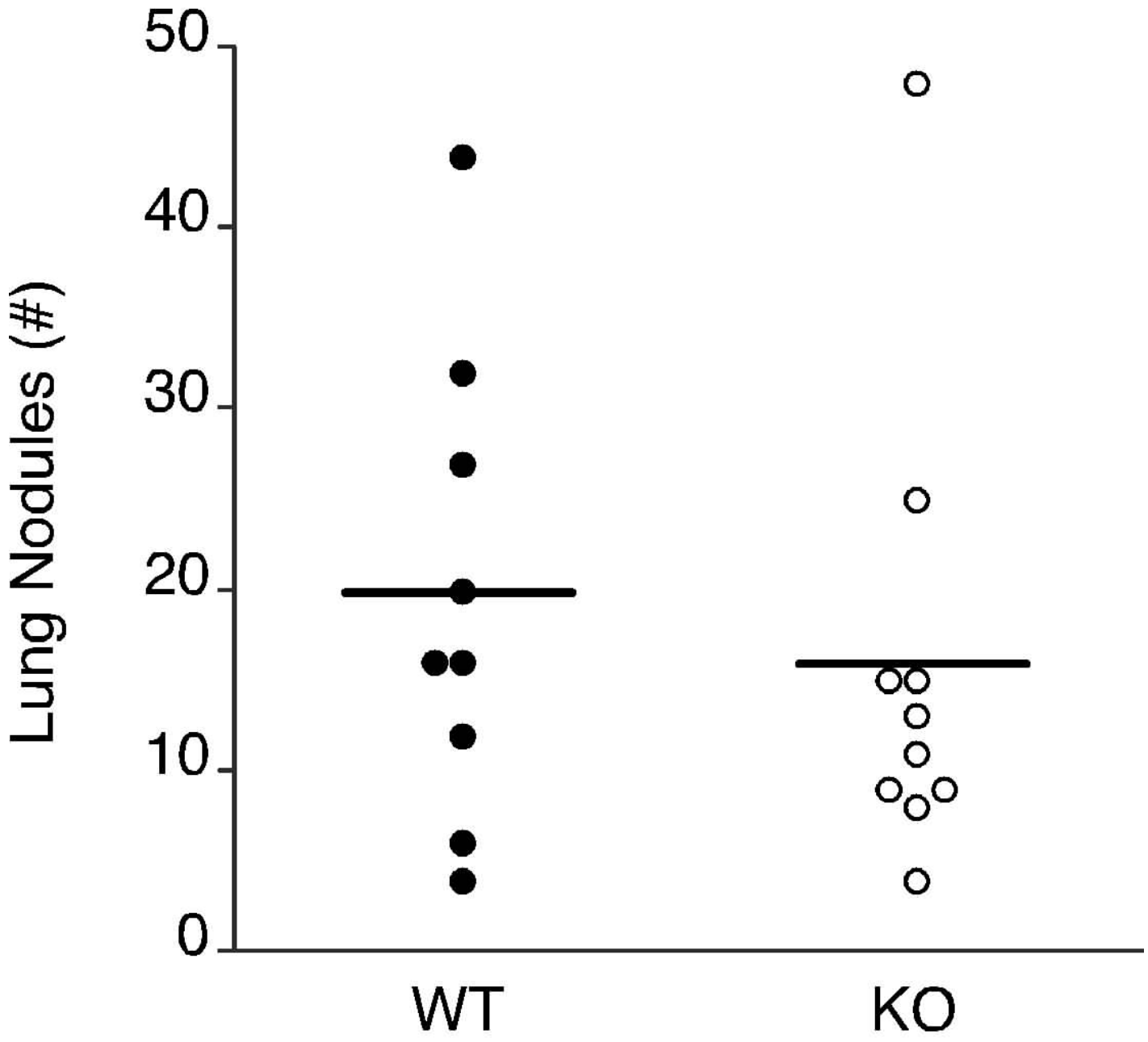
Genotype	Number	Percentage
+/+	27	30%
+/-	35	40%
-/-	26	30%

total n=88 *P=0.16*

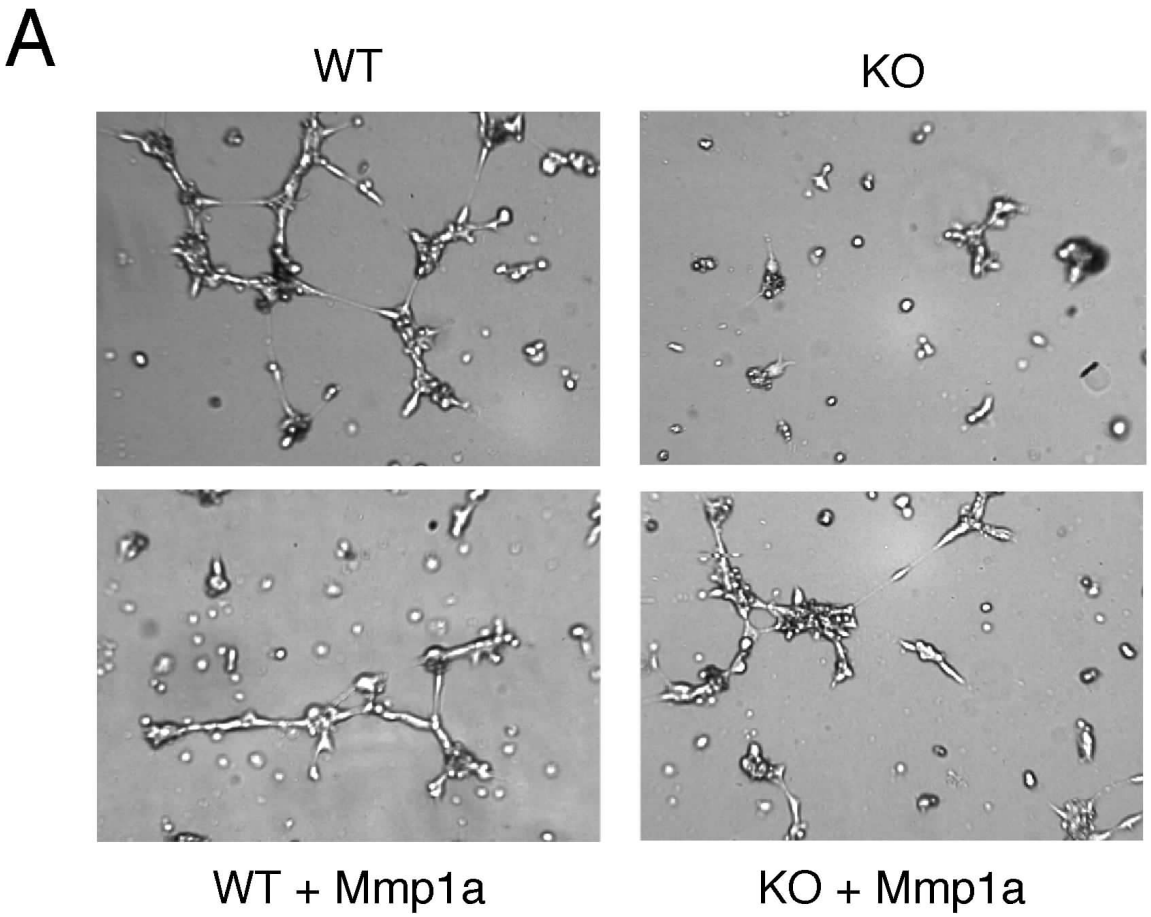
C

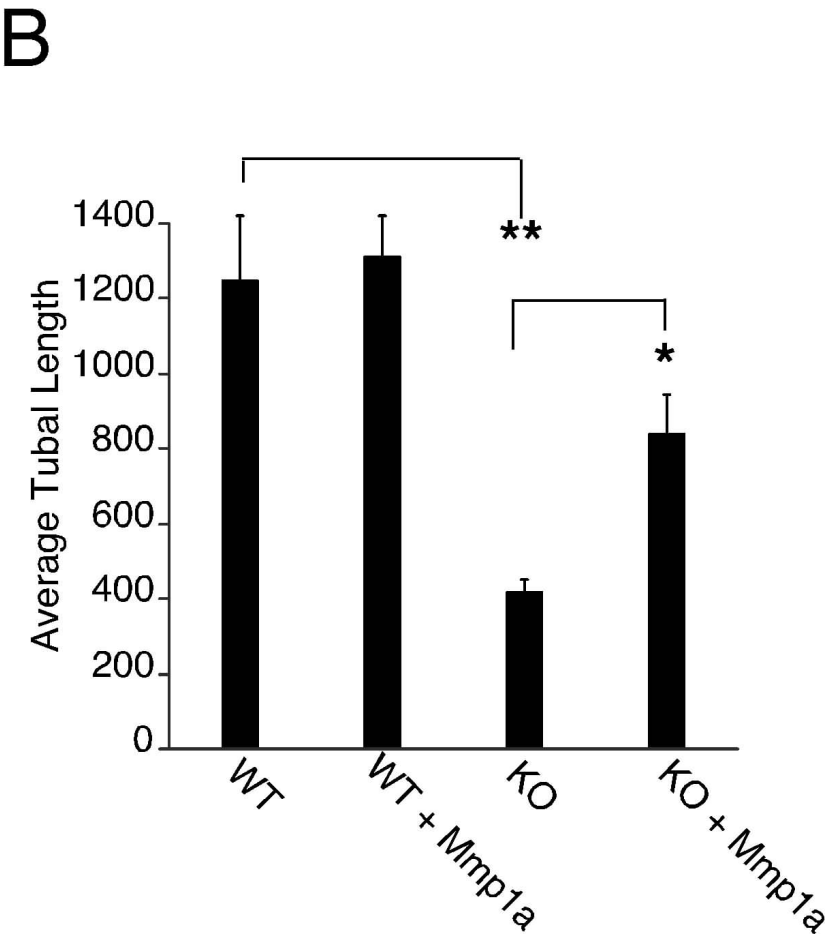


Supplementary Figure S2

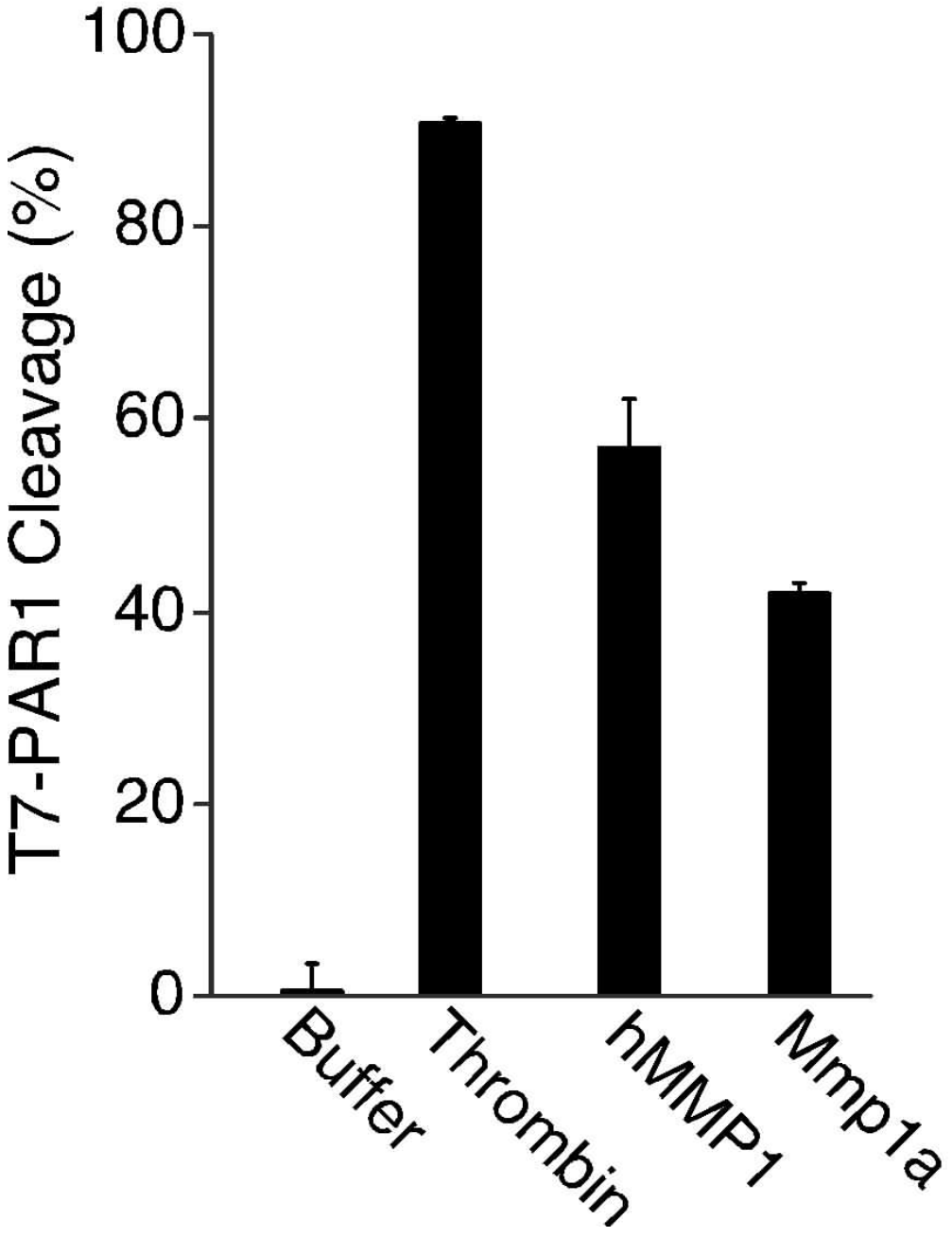


Supplementary Figure 3





Supplementary Figure S4



Supplementary Figure S5