Supplemental Figure Legends

Supplemental Figure 1. Sorting of urine-infiltrating monocytic cells during BCG therapy. $Lin^{neg}CD14^{+}CD33^{+}HLADR^{low}$ (red) and $Lin^{neg}CD14^{+}CD33^{+}HLADR^{high}$ (grey) were FACS-sorted from post-BCG urine samples. The panels show overlay of both cell subsets after sorting (purity is indicated) from 1 representative sample out of 7.

Supplemental Figure 2. Bladder cancer cells and BCG induce monocytic MDSC *in-vitro.* PBMC from healthy donors (at least five per conditions) were co-cultured for 4 days with Bu68.8 or T24 cells (**A**), or with BCG at 3 different doses (MOI 0.05, 0.5 and 5) (**B**) and the effects of *Salmonella enterica* serovar Typhi strain Ty21a and heat-killed BCG (30min at 85°C) were compared to live BCG (MOI=0.5) (**C**). Graphs show the percentage of M-MDSC ($Lin^{neg}CD14^{+}CD33^{+}$ $CD11b^{+}HLA\text{-}DR^{low}$ cells) in indicated conditions compared to medium only. One-way ANOVAs followed by Dunnett's (**A,B**) or Tukey's (**C**) tests: * $p<0.05$; ** $p<0.01$; *** $p<0.001$; **** $p<0.0001$). (**D**) PBMCs were co-cultured with indicated cell lines for 4 days; $CD14^{+}$ cells were then sorted and subsequently co-cultured with autologous CFSE-labeled T cells (3-day stimulation with anti-CD3/CD28). Proliferation profiles are depicted in histograms of CFSE fluorescence intensity in indicated T-cell populations from 1 representative donor out of 4. Div: % cells with at least one division; PI: Proliferation Index.

Supplemental Figure 3. Recurrence-free and progression-free survivals. Recurrence-free (**A**) and progression-free (**B**) survivals were assessed using the Kaplan-Meier approach in the cohort of 28 patients receiving BCG therapy (with the first instillation at month 0 and the last at month 1.5). Censored patients are represented by tick marks.

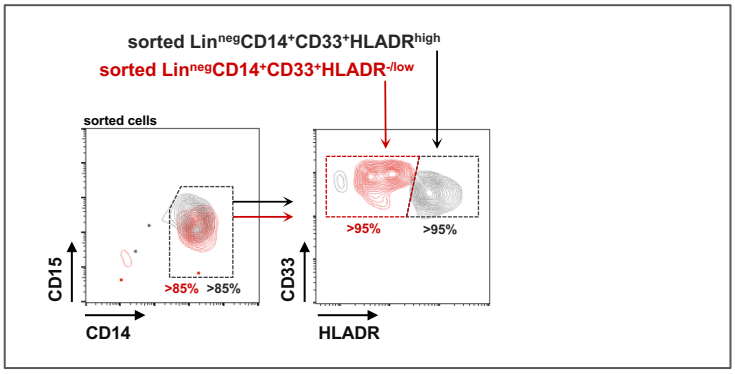
Supplemental Figure 4. Th1/Th2 profiles of urine-infiltrating CD4 T cells during BCG therapy. (A-B) CD4 T cells were expanded *ex-vivo* from twelve urine samples from patients with high (T/M^{high}, n=6) or low (T/M^{low}, n=6) T/MDSC ratio. (**A**) CXCR3 and CRTH2 expression in *ex vivo*-expanded CD4 T cells. (**B**) Th1 cytokines (IFN-γ, IL-2, TNF-α) and Th2 cytokines (IL-4 and IL-5) were measured in the supernatants of activated *ex vivo*-expanded CD4 T cells from urine samples and a "Th2 versus Th1" score was calculated (see methods section) for each sample. (**C**) IDO activity as assessed by the Kynurenins-to-Tryptophan (K/T) ratio in urine samples from patients of the T/M^{high} (n=9) and T/M^{low} (n=9) groups. Two-sided t-tests: *$p<0.05$.

Supplemental Figure 5. Induction of ILC2 by different bacteria. PBMC from 3 healthy donors were co-cultured with *Salmonella enterica* serovar Typhi strain Ty21a or with heat-killed or live BCG (MOI=1) for 4 days. Graph shows the percentage of ILC2 among ILC. One-way ANOVA followed by Tukey's test: *p<0.05; ** p<0.01; *** p<0.001.

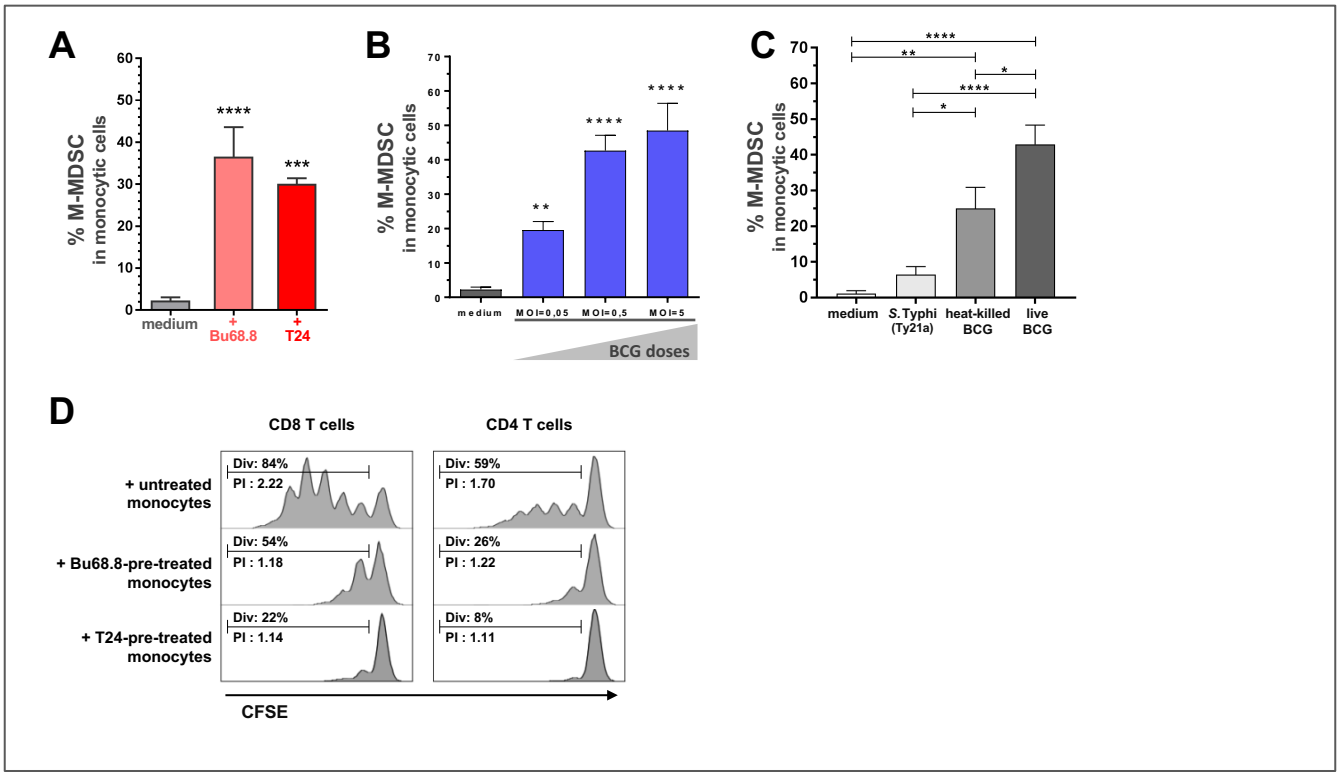
Supplemental Figure 6. Expression of CCR4 in peripheral and urine ILC from NMIBC patients and production of PGD2 by tumor cell lines. (**A**) *Ex-vivo* expression of CCR4 on peripheral ILC1 ($Lin^{neg}CD127^{+}CRTH2^{neg}c\text{-}Kit^{neg}$), ILC2 ($Lin^{neg}CD127^{+}CRTH2^{+}$) and ILC3 ($Lin^{neg}CD127^{+}CRTH2^{neg}c\text{-}Kit^{+}$) from patients with non-muscle invasive bladder cancer (NMIBC; n=10) (one-way ANOVA followed by Tukey's test: *p<0.05; **** p<0.0001). (**B**) CCR4 expression in ILCs from 3 urine samples during BCG therapy. (**C**) Detection of PGD2 in the supernatants of indicated bladder tumor cell lines (biological duplicates) in the presence or absence of 30 µM arachidonic acid (AA) as substrate (dashed line indicates limit of detection).

Supplemental Figure 7. Phenotypic analysis of IL-13 treated sorted monocytes. Sorted $CD14^{+}$ cells from PBMC of HD (n=4) were cultured for 4 days with or without recombinant IL-13 (100ng.mL^{-1}). (**A**) Representative FACS-histograms showing HLA-DR expression in indicated conditions. (**B**) HLA-DR expression density (geometric mean fluorescence intensity, MFI) and frequency of $HLA\text{-}DR^{low}$ in $CD14^{+}$ cells. (**C**) Expression levels of various monocytes/macrophages markers on $HLA\text{-}DR^{low}$ and $HLA\text{-}DR^{high}$ $CD14^{+}$ cells treated or not with IL-13. (**D**) Relative expression of Arginase-1, iNOS and C/EBPβ transcripts by qPCR in $CD14^{+}$ cells treated or not with IL-13. (**E**) Corresponding supernatants were harvested and soluble markers were measured by multiplex assay. Two-sided paired t-tests (**B,D,E**) or one-way ANOVAs followed by Tukey's tests (**C**). * p<0.05; ** p<0.01, **** p<0.0001.

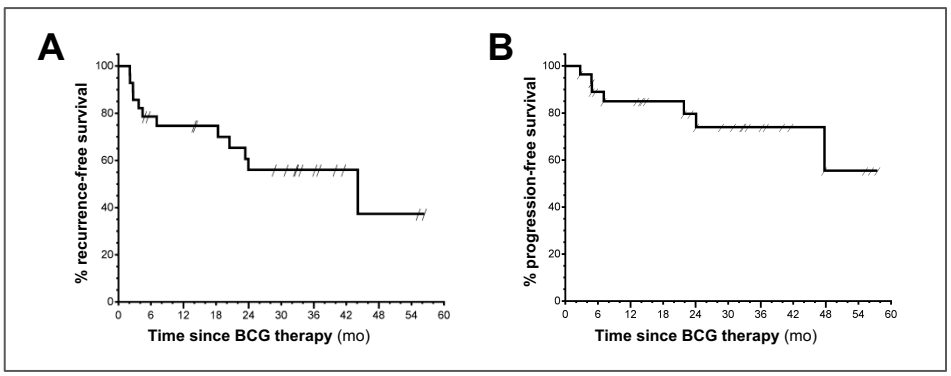
Supplemental Figure 1.



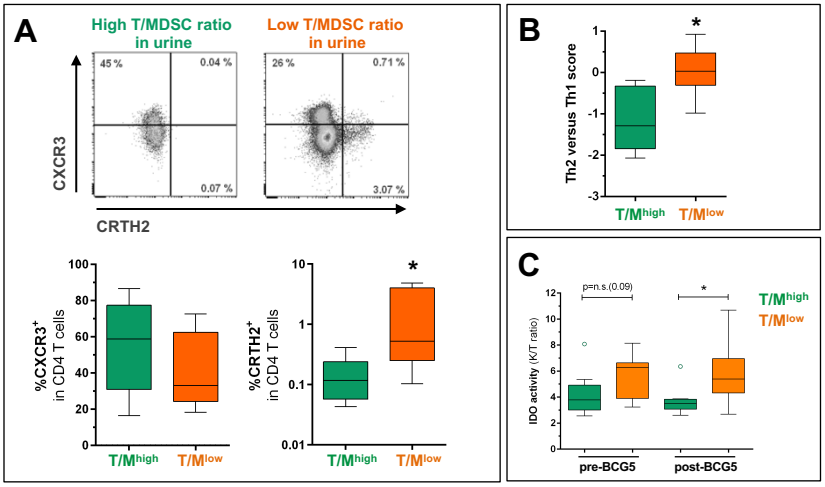
Supplemental Figure 2.



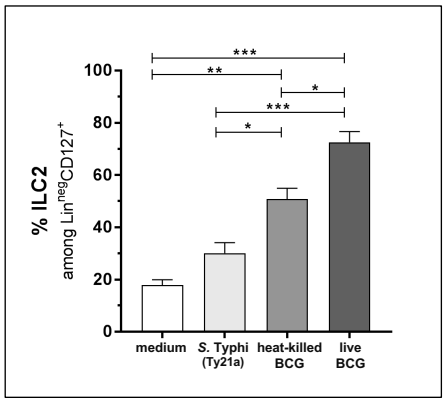
Supplemental Figure 3.



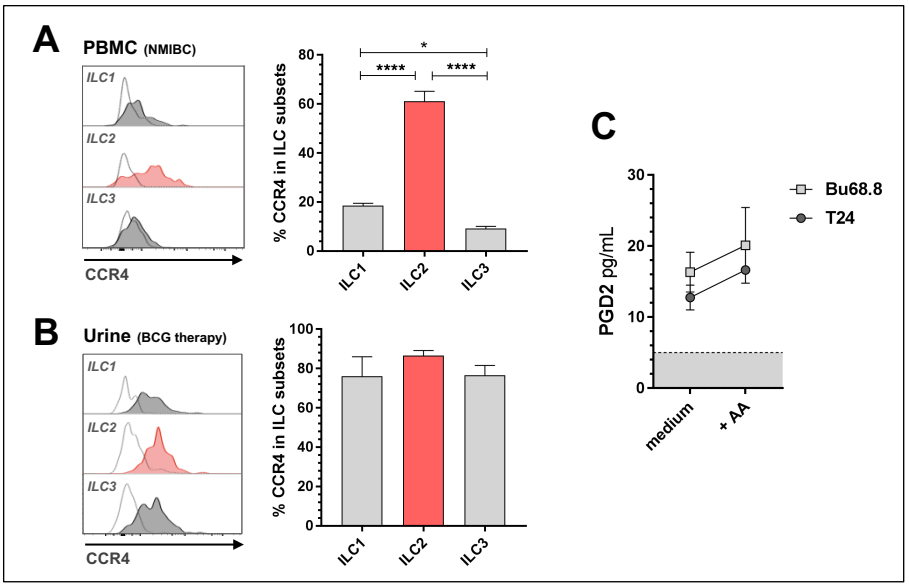
Supplemental Figure 4.



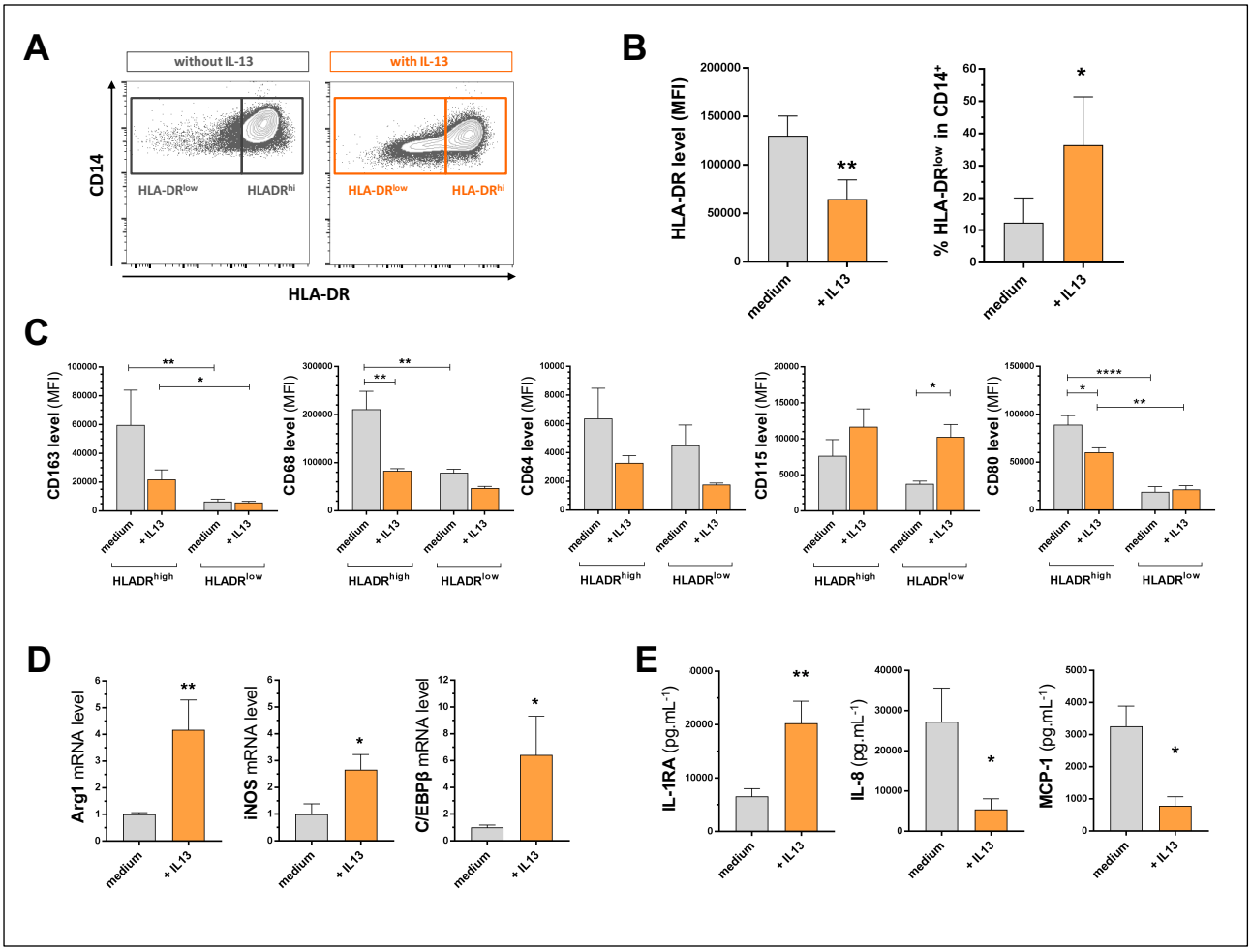
Supplemental Figure 5.



Supplemental Figure 6.



Supplemental Figure 7



Supplementary Table 1. Characteristics of MIBC patients

Characteristics	All patients
N° of patients	23
Age, yr, median (IQR)	71 (65-805)
Sex, n	
Male	18
Female	5
Tumor status, n (%)	
pT2	6 (26.1)
pT3	14 (60.9)
pT4	3 (13)
Draining lymph node status, n (%)	
Nx	5 (21.7)
N0	10 (43.5)
N1	4 (17.4)
N2	4 (17.4)
Neoadjuvant chemotherapy	10 (43.5)