**Supplemental materials**

**Supplemental Figure S1. Meta-analysis of the deleterious effects mediated by ATB during cancer immunotherapy. Search strategy, flow chart of study inclusion and statistics.**

We conducted a systematic review of literature on MEDLINE and EMBASE as of December 23rd 2020, as well as a review of all abstracts from the American Society of Clinical Oncology (ASCO) and the European Society of Medical Oncology (ESMO). All English-language retrospective and prospective clinical studies meeting the following criteria were included: observational cohort studies on the impact of ATB on ICI therapy (anti-PD-(L)1 and/or anti-CTLA-4), abstract or article available, adult population, solid tumors, HR for OS specified for pooled analysis. Unpublished studies were also screened in order to limit publication bias. Studies involving duplicated cohorts were excluded. The following data were extracted from individual publications: retrospective vs prospective nature of the study, year of publication, total number of patients in the cohort, number of patients treated with ATB, timing of ATB administration with regard to ICI therapy initiation and HR for OS (including the upper and lower boundaries of the 95% confidence interval). The timing of ATB exposure was categorized into three groups: ATB any time before IO initiation, ATB 60 days before until 42 days after ICI initiation or ATB mostly after ICI initiation (refer to Figure 1). A comprehensive list of excluded studies is outlined in Supplemental Table 1, with the corresponding reasons for exclusion. A Chi2 Cochrane Q test was used in order to quantify the heterogeneity between the included studies. Considering presence of such inter-study heterogeneity between patient cohorts (I2=84.9%), a random effect model was used in order to pool effect size estimates for OS. All meta-regression analyses were performed using R software version 4.0.3.

68 abstracts reviewed

2590 publications identified from MEDLINE/EMBASE or retrieved from ASCO/ESMO abstract libraries

2522 studies screened and excluded from title or due to study duplication

30 studies excluded
(*see Supplemental Table 1*)

38 studies (41 cohorts) included for pooled analysis



**Supplemental Figure 2.** **Meta-analysis gathering 38 studies analyzing the impact of ATB on the efficacy of ICI in cancer patients.**

Same study as the one described in Fig. 1 but analyzing all the patients regardless of the timing of ATB uptake in the course of ICI therapy across various malignancies.

**Supplemental Tables**

**Table S1. Gut microbiome signatures (GOMS) in cancer patients receiving ICI.GOMS in cancer patients receiving ICI**

**Table S2. Preclinical models with a cause-effect relationship between commensals and anticancer effects.**

**Table S3. MCI based on FMT.**

**Table S4. MCI based on pre- and pro-biotics.**