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| **Table S1 GOMS in cancer patients receiving ICI** |
| **Cancer** | **ICI** | **N=** | **Response Evaluation** | **Diversity** | **GOMS (abundant in R)** | **GOMS (abundant in NR)** | **Country** | **Sample** | **Sequencing** | **References** |
| MM | Anti-CTLA-4+/-anti-PD-1 | 39 | DCR | No difference | *Bacteroides caccae* | *Coriobacteriaceae* | USA | Stool | MGN | *(Frankel et al. 2017)* |
|  |  |  |  |  | *Streptococcus parasanguinis* | *Atopobium parvulum* |  |  |  |  |
|  |  |  |  |  | *Faecalibacterium prausnitzi* | *Acidaminococcaceae* |  |  |  |  |
|  |  |  |  |  | *Bacteroides thetaiotamicron* |  |  |  |  |  |
|  |  |  |  |  | *Holdemania filiformis* |  |  |  |  |  |
|  |  |  |  |  | *Dorea formicogenerans* |  |  |  |  |  |
| MM | Anti-CTLA-4 | 26 | CBR, 6m-PFS | Not adressed | *Faecalibacterium prausnitzii* | *Bacteroides* | France | Stool | 16S rRNA  | *(Chaput et al. 2017)* |
|  |  |  |  |  | *unclassified Ruminococcaceae* |  |  |  |  |  |
|  |  |  |  |  | *Clostridium XIVa* |  |  |  |  |  |
|  |  |  |  |  | *Blautia* |  |  |  |  |  |
| MM | Anti-PD-1 | 27 | PFS | Increased in R | *Faecalibacterium prausnitzii* | *Bacteroides ovatus* | USA | Stool | 16S rRNA  | *(Peters et al. 2019)* |
|  | Anti-CTLA-4 |  |  |  | *Coprococcus eutactus* | *Ruminococcus gnavus* |  |  | MGN |  |
|  | Anti-CTLA-4+/-anti-PD-1  |  |  |  | *Prevotella stercorea* | *Bacteroides dorei* |  |  |  |  |
|  |  |  |  |  | *Streptococcus sanguinis* | *Bacteroides massiliensis* |  |  |  |  |
|  |  |  |  |  | *Streptococcus anginosus* | *Blautia producta* |  |  |  |  |
|  |  |  |  |  | *Lachnospiraceae bacterium 3 1 46FAA* |  |  |  |  |  |
| MM | Anti-PD-1 | 43 | CBR, PFS | Increased in R | *Clostridiales* | *Bacteroidales* |  USA | Stool | 16S rRNA  |  *(Gopalakrishnan et al. 2018)* |
|  |  |  |  |  | *Ruminococcaceae* |  |  |  |  |  |
|  |  |  |  |  | *Faecalibacterium* |  |  |  |  |  |
| MM | Anti-PD-1 | 42 | ORR | Not adressed | *Bifidobacterium longum* | *Ruminococcus obeum* | USA | Stool | 16S rRNA  | *(Matson et al. 2018)* |
|  |  |  |  |  | *Collinsella aerofaciens* | *Roseburia intestinalis* |  |  |  |  |
|  |  |  |  |  | *Enterococcus faecium*  |  |  |  |  |  |
| MM | Anti-CTLA-4 | 38 | 6m-PFS | Not adressed | *Faecalibacterium*   | *Bacteroides* | France | Stool | MGN | *(Coutzac et al. 2020)* |
|  |  |  |  |  | *Gemminger* |  |  |  |  |  |
| MM | Anti-CTLA-4+/-antiPD-1  | 25 | 12w-DCR | No difference | *Streptococcus parasanguinis* | *Peptostreptococcaceae* | Netherlands | Stool | MGN | *(Wind et al. 2020)* |
|  |  |  |  |  | *Bacteroides massiliensis* |  |  |  |  |  |
|  |  |  |  |  | *Akkermansia muciniphila* |  |  |  |  |  |
| MM | Anti-CTLA-4+/-anti-PD-1  | 130 | RECIST 1.1 | No difference | *Faecalibacterium* | *Bacteroides* | Meta-analysis | Stool | MGN | *(Limeta et al. 2020)* |
|  |  |  |  |  |  *Barnesiella intestinihominis* |  |  |  |  |  |
| NSCLC | Anti-PD-1 | 37 | PFS | Increased in R | *Alistipes putredinis* | *Ruminococcus\_unclassified* | China | Stool | 16S rRNA | *(Jin et al. 2019)* |
|  |  |  |  |  | *Bifidobacterium longum* |  |  |  |  |  |
|  |  |  |  |  | *Prevotella copri* |  |  |  |  |  |
| NSCLC | Anti-PD-1 | 17 | ORR, TTF | NA | *Lactobacillus* | *Bilophila* | Japan | Stool | 16S rRNA | *(Katayama et al. 2019)* |
|  |  |  |  |  | *Clostridium* | *Sutterella* |  |  |  |  |
|  |  |  |  |  | *Syntrophococcus* |  |  |  |  |  |
| NSCLC | Anti-PD-(L)1 | 70 | DCR, 12m-OS | Increased in R | *Clostridiales* | *Parabacteroides* | Japan | Stool | 16S rRNA | *(Hakozaki et al. 2020)* |
|  |  |  |  |  | *Ruminococcaceae UCG 13* | *Tannerellaceae* |  |  |  |  |
|  |  |  |  |  |  | *Fusobacteriales* |  |  |  |  |
|  |  |  |  |  |  | *Prophyromonadaceae* |  |  |  |  |
| NSCLC | Anti-PD-1 | 63 | 6m-PFS | Increased in R | *Parabacteroides* | *Veillonella* | China | Stool | MGN | *(Song et al. 2020)* |
|  |  |  |  |  | *Methanobacteriaceae* | *Selenomonadales* |  |  |  |  |
|  |  |  |  |  |  | *Negativicutes* |  |  |  |  |
| NSCLC | Anti-PD-1 | 11 | PFS | NA | *Propionate* | *2-Pentanone*  | Italy | Stool | NA | *(Botticelli et al. 2020)* |
|  |  |  |  |  | *Butyrate* | *tridecane* |  |  |  |  |
|  |  |  |  |  | *Lysine*  |  |  |  |  |  |
|  |  |  |  |  | *Nicotinic acid* |  |  |  |  |  |
| NSCLC/SLC | Chemotherapy | 64 | RECIST 1.1 | No difference | *Streptococcus mutans* | *Leuconostoc lactis* | China | Stool | MGN | *(Zhao et al. 2021)* |
|  |  |  |  |  | *Enterococcus casseliflavus* | *Eubacterium siraeum* |  |  |  |  |
| NSCLC/gastric | Anti-PD-1 | 38 | CBR, PFS | Increased in R | *Clostridiales* |  | Japan | Stool | 16S rRNA | *(Fukuoka et al. 2018)* |
| NSCLC/RCC | Anti-PD-1 | 100 | DCR, 3m-PFS, 6m-PFS | NA | *Firmicutes* | *Parabacteroides distasonis* | France | Stool | MGN | *(Routy et al. 2018)* |
|  |  |  |  |  | *Akkermansia muciniphila* | *Bacteroides nordi* |  |  |  |  |
|  |  |  |  |  | *Eubacterium spp* |  |  |  |  |  |
|  |  |  |  |  | *Ruminococcaceae* |  |  |  |  |  |
|  |  |  |  |  | *Alistipes indistinctus* |  |  |  |  |  |
| RCC | Anti-PD-1 | 58 | CBR, 12m-PFS | Increased in R | *Akkermansia muciniphila* | *Erysipelotrichaceae bacterium\_2\_2\_44A*  | France | Stool | MGN | *(Derosa et al. 2020)* |
|  |  |  |  |  | *Eubacterium spp* | *Clostridium hathewayi*  |  |  |  |  |
|  |  |  |  |  | *Ruminococcaceae* | *Clostridium clostridioforme* |  |  |  |  |
|  |  |  |  |  | *Bacteroides salyersiae*  |  |  |  |  |  |
|  |  |  |  |  | *Eubacterium siraeum*  |  |  |  |  |  |
| RCC | Anti-PD-1 | 22 | ORR | Increased in R | *Akkermansia muciniphila* |  | USA | Stool | 16S rRNA | *(Agarwal et al 2020)* |
| PC | Surgery | 43 | Survival | Increased in R | *Pseudoxanthomonas* | No predominant genus | USA | Tumor | 16S rRNA | *(Riquelme et al. 2019)* |
|   |   |   |   |   | *Saccharopolyspora* |   |   |   |   |  |
|   |   |   |   |   | *Streptomyces* |   |   |   |   |  |
| HCC | Anti-PD-1 | 8 | CBR | Increased in R | *Akkermansia muciniphila*  | Bacteroides nordii | China | Stool | MGN | *(Zheng et al. 2019)* |
|   |   |   |   |   | *Ruminococcaceae spp*  | Fusobacterium varium |   |   |   |  |
|   |   |   |   |   | *Bifidobacterium dentium* |   |   |   |   |  |
|   |   |   |   |   | *Dialister invisus* |   |   |   |   |  |
|   |   |   |   |   | *Coprococcus comes* |   |   |   |   |  |
| CRC | Neoadjuvant CRT | 84 | Tumor regression grade | No difference | *Roseburia* | Coriobacteriaceae  | China | Stool | 16S rRNA | *(Yi et al. 2020)* |
|   |   |   |   |   | *Dorea* | Fusobacterium |   |   |   |  |
|   |   |   |   |   | *Anaerostipes* |   |   |   |   |  |
| CRC | Preoperative CRT | 45 | Complete Response | Increased in R | *Duodenibacillus massiliensis* | Bacteroidales | Korea | Stool | 16S rRNA | *(Ang et al. 2020)* |
| CRC | Anti-PD-(L)1/PD-1 | 74 | RECIST 1.1 | No difference | *Prevotella*  | Bacteroides | China | Stool | MGN | *(Peng et al. 2020)* |
|   |   |   |   |   |  *Ruminococcaceae*  |   |   |   |   |  |
|   |   |   |   |   | *Lachnospiraceae* |   |   |   |   |  |
| Solid cancers  | Anti-PD-1 | 52 | RECIST 1.1 | NA | *Acetic acid* |   | Japan | Stool | NA | *(Nomura et al. 2020)* |
|   |   |   |   |   | *Propionic acid* |   |   |   |   |  |
|   |   |   |   |   | *Butyric acid* |   |   |   |   |  |
|   |   |   |   |   | *Valeric acid* |   |   |   |   |  |
| Solid cancers  | Chemotherapy/Immunotherapy | 26 | RECIST 1.1 | Increased in R | *Bacteroides xylanisolvens* | Clostridium symbiosum | NA | Stool | MGN | *(Heshiki et al. 2020)* |
|   |   |   |   |   | *Bacteroides ovatus* | Ruminococcus gnavus |   |   |   |  |
|   |   |   |   |   | *Prevotella copri* |   |   |   |   |  |
|   |   |   |   |   | *Alistipes spp* |   |   |   |   |  |
|  |  |  |  |  |  |  |  |  |  |  |

CBR: Clinical Benefit Rate; CRT: Chemoradiotherapy; DCR: Disease Control Rate; MGN : Metagenomic; MM : Metastatic Melanoma; NA : Not Applicable; NR : Non-Responder; NSCLC : Non-Small Cell Lung Cancer; OS: Overall Survival; PC: Pancreatic cancer; PFS: Progression-free survival; R : Responder; RCC : Renal Cell Carcinoma; RECIST: Response Evaluation Criteria in Solid Tumours.