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Introduction:
Lymphopenia appears characterizing COVID-19 [1]. Its depth on admission seems associated with prognosis [2], and exposes COVID-19 patients to secondary infections [3]. Current reports on immune response during severe COVID-19 are restricted to single cross sectional assessment on admission. Thus, we assessed the immune profile of patients admitted to the ICU for COVID-19-related ARDS and its evolution during the first week of stay.

Methods:
Prospective, observational study in consecutive patients admitted for COVID-19-related ARDS in our ICU. Peripheral blood was sampled on admission and on Day 3, 5 and 8 for immunophenotyping of lymphocytes (T, NK, B cells quantification, CD4+ and CD8+ T cells function), granulocytes (CD16- immatures granulocytes (IG), CD64+) and monocytes (mHLA-DR). Pro-inflammatory T cells cytokine production (IFN-γ, TNF-α, and IL-2) was assessed in 3 patients and 3 controls.

Results:
13 patients were included (8 men (62%); 72 [64–76] y/o; 8 severe ARDS (62%)). All exhibited deep global lymphopenia that persisted to D7 (Fig 1). Increased proportion of regulatory T cells correlated with defective production of IFN-γ by CD4+ T cells. Accordingly, effector CD4+ frequencies were decreased; those of effector memories CD8+ and HLA-DR+, CD38+ activated CD8+ were increased. Increased number of granulocytes was observed with a rise of CD64 expression; IG were barely detected at admission. Monocyte counts were also increased with a major HLA-DR down regulation.

Conclusion:
Patients with COVID-19 showed sustained alterations of immune response with deep and persistent global lymphopenia which was correlated to increased T cells exhaustion and increased non-functional antigen presenting cells. These preliminary data warranting further confirmation suggest that therapies boosting host immunity could be a path worth following for COVID-19.

References:

Lymphocyte, granulocyte and monocyte subsets evaluated by flow cytometry of 13 COVID-19 ICU patients. Box plot represents results for 10 healthy subjects (control) and for 13 COVID-19 ICU patients: Boxes give the median with the first and the third quartile. Whiskers represent min to max. Mann-Whitney test p-values are represented by ns, *, ** and *** for $p > 0.05$, $p \leq 0.05$, $p \leq 0.01$ and $p \leq 0.001$ respectively.