**Immunology of COVID-19: mechanisms, clinical outcome, diagnostics and perspectives – a report of the European Academy of Allergy and Clinical Immunology (EAACI)**

**Short title:** Immunology of COVID-19: an EAACI report

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**Authors’ contributions (according to authorship order)**

SM drafted the manuscript, SM, JJ and PSI contributed “SARS-CoV-2 receptors: proven virus interaction partners and structural considerations”, SM, MJ, SWCB and SJ wrote “Airway epithelium: hotspot for disease development”, SM, SWCB and SM “T cell-related mechanisms: lymphopenia, T cells over-activation and T cell exhaustion”; LZ designed the figures and the graphical abstract and wrote the figure legends; AI and KKI wrote “Multi-morbidities as a risk factor for COVID-19 course”, “Sex and ageing as a risk factor for COVID-19 course” and “Allergy-related risk for COVID-19”; AI, SA and vdWW contributed “Immunological diagnosis of SARS-CoV2 infections: challenges of current approaches”; AI and GCC contributed “Future pandemic prevention strategies based on immunological knowledge”; ACA and ES wrote “Skin barrier: more than just matter of wearing protective equipment”; AD contributed “Myocardial and endothelial damage: an immunological perspective on cardiological presentation of COVID-19”; AM, SA, JSR and vdWW wrote “B-cell-related mechanisms and antibody-responses”; BW and PF contributed “Neurological disease presentation”; BH, FW, MH and TG wrote “Kids versus adults: mechanisms explaining the clinical differences”; ET, JM, KA, PO contributed “Immunological treatment approaches: biologicals, small molecules and beyond“; CO and PO wrote “trained immunity”. EA wrote “Dendritic cells and macrophages” together with MM and PO; HSK and UE contributed “From oral to rectal mucosa: what do we know about the involvement of the gastrointestinal tract in COVID-19”; JSR and KA provided the tables; KE wrote “Neutrophils and eosinophils” and “Immunological biomarker profiling of COVID-19 for prediction of disease severity”; KKI wrote “ILC and NK cells” with MH; MJ and OML wrote “Virome interactions with commensal communities: future prevention and treatment strategies for SARS-CoV2 infections?”; MM wrote “Lung pathologies in COVID-19” and “COVID-19-related kidney failure”; NK and PM contributed “Complement and SARS-CoV-2” and “Coagulation parameters in COVID-19 patients”, PO and OC wrote “trained immunity“ part SM and UE orchestrated the whole process and conducted the final editing; UE and SM wrote the Introduction and Abstract. All authors contributed to the manuscript, revised, and edited.

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**Supplemental Information**

**Search terms for the therapeutic approaches**

**Search terms and literature review strategy (1)**

On April 25, 2020, the following search terms were used for screening literature on databases including PubMED and preprint server bioRxiv for available data on association between COVID-19 and novel immunological treatment options including anti IL-6, TNF, CD147, and IL-1 antibodies:

("COVID-19"[All Fields] OR "COVID-2019"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019-nCoV"[All Fields] OR "SARS-CoV-2"[All Fields] OR "2019nCoV"[All Fields] OR (("Wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12[PDAT] OR 2020[PDAT]))) AND (("tocilizumab"[Supplementary Concept] OR "tocilizumab"[All Fields]) OR ("sarilumab"[Supplementary Concept] OR "sarilumab"[All Fields]) OR ("etanercept"[MeSH Terms] OR "etanercept"[All Fields]) OR ("infliximab"[MeSH Terms] OR "infliximab"[All Fields]) OR ("adalimumab"[MeSH Terms] OR "adalimumab"[All Fields]) OR ("certolizumab pegol"[MeSH Terms] OR ("certolizumab"[All Fields] AND "pegol"[All Fields]) OR "certolizumab pegol"[All Fields] OR "certolizumab"[All Fields]) OR ("golimumab"[Supplementary Concept] OR "golimumab"[All Fields]) OR ("mepolizumab"[Supplementary Concept] OR "mepolizumab"[All Fields]) OR ("interleukin 1 receptor antagonist protein"[MeSH Terms] OR "interleukin 1 receptor antagonist protein"[All Fields] OR "anakinra"[All Fields])). These search terms identified 40 manuscripts.

**Search terms and literature review strategy (2)**

On April 25, 2020, the following search terms were used for screening literature on databases including PubMED and preprint server bioRxiv for available data on association between COVID-19 and novel immunological treatment options including passive immunizations:

("COVID-19"[All Fields] OR "COVID-2019"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019-nCoV"[All Fields] OR "SARS-CoV-2"[All Fields] OR "2019nCoV"[All Fields] OR (("Wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12[PDAT] OR 2020[PDAT]))) AND ((passive[All Fields] AND sensitization[All Fields]) OR (protective[All Fields] AND ("antibodies"[MeSH Terms] OR "antibodies"[All Fields])) OR hyperimmunoglobulin[All Fields] OR ("antibodies, blocking"[MeSH Terms] OR ("antibodies"[All Fields] AND "blocking"[All Fields]) OR "blocking antibodies"[All Fields] OR ("blocking"[All Fields] AND "antibodies"[All Fields])) OR (convalescent[All Fields] AND ("plasma"[MeSH Terms] OR "plasma"[All Fields]))). These search terms identified 38 manuscripts.

**Search terms and literature review strategy (3)**

On April 25, 2020, the following search terms were used for screening literature on databases including PubMED and preprint server bioRxiv for available data on association between COVID-19 and novel immunological treatment options including Th17 axis inhibitors, type 3 + 1 inhibitors, anti-CD20, BAFF, PD1, CD200, and VEGF-A antibodies, costimulatory blockade and JAK inhibitors, and other small molecule inhibitors:

("COVID-19"[All Fields] OR "COVID-2019"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019-nCoV"[All Fields] OR "SARS-CoV-2"[All Fields] OR "2019nCoV"[All Fields] OR (("Wuhan"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND (2019/12[PDAT] OR 2020[PDAT]))) AND (("secukinumab"[Supplementary Concept] OR "secukinumab"[All Fields]) OR ("ixekizumab"[Supplementary Concept] OR "ixekizumab"[All Fields]) OR ("brodalumab"[Supplementary Concept] OR "brodalumab"[All Fields]) OR ("ustekinumab"[MeSH Terms] OR "ustekinumab"[All Fields]) OR ("rituximab"[MeSH Terms] OR "rituximab"[All Fields]) OR belimumab'[All Fields] OR ("abatacept"[MeSH Terms] OR "abatacept"[All Fields]) OR ("tofacitinib"[Supplementary Concept] OR "tofacitinib"[All Fields]) OR ("baricitinib"[Supplementary Concept] OR "baricitinib"[All Fields]) OR ("INCB018424"[Supplementary Concept] OR "INCB018424"[All Fields] OR "ruxolitinib"[All Fields]) OR ("upadacitinib"[Supplementary Concept] OR "upadacitinib"[All Fields]) OR ("peficitinib"[Supplementary Concept] OR "peficitinib"[All Fields]) OR ("oclacitinib"[Supplementary Concept] OR "oclacitinib"[All Fields]) OR ("Fedratinib"[Supplementary Concept] OR "Fedratinib"[All Fields] OR "fedratinib"[All Fields]) OR ("imatinib mesylate"[MeSH Terms] OR ("imatinib"[All Fields] AND "mesylate"[All Fields]) OR "imatinib mesylate"[All Fields] OR "imatinib"[All Fields]) OR ("fevipiprant"[Supplementary Concept] OR "fevipiprant"[All Fields]) OR ("bevacizumab"[MeSH Terms] OR "bevacizumab"[All Fields]) OR anti-PD1[All Fields] OR anti-CD200[All Fields]) These search terms identified 12 manuscripts. On May 15, 2020, 12 publications were found during an additional search and were added.