Category :**Sepsis: basic mechanisms**

A91 - ***Analysis of mitochondrial function in covid-19 patients using in vivo and ex vivo techniques***

L.W.J.M. Streng [1] ; EG Mik [1] ; CJ De Wijs [1] ; NJH Raat [1] ; PAC Specht [1] ; M Van der Kaaij [1] ; MH Wijnen [1] ; D Sneiders [1] ; H Endeman [2] ; FA Harms [1]

[1]Erasmus MC, Anesthesiology, Rotterdam , Netherlands, [2]Erasmus MC, Intensive Care Unit, Rotterdam , Netherlands

Introduction:

Mitochondrial dysfunction has been linked to the persistent hypoxia and altered aerobic glycolytic metabolism seen in COVID-19 patients. This observational pilot study assessed mitochondrial function in COVID-19 patients and healthy controls (HC) utilizing *in vivo* and *ex vivo* techniques.

Methods:

This single center observational study examined COVID-19 patients on two time points, the first within 72 hours after intensive care admission (T1), and the second seven days after T1 (T2). HC were age and sex matched to the included COVID-19 patients.

In vivo epidermal mitochondrial oxygen utilization was analyzed using the COMET (Cellular Oxygen METabolism) monitor, which employs the protoporphyrin-IX triplet state technique.

Ex vivo measurements consisted of *in vitro* mitochondrial respiration analyzed by the Oroboros O2k respirometer and free mitochondrial DNA (fMtDNA) which was isolated from plasma and quantified by qPCR.

Results:

16 COVID-19 sepsis patients and 16 HC were included. The median MitoVO_2 of COVID-19 patients on T1 was 4.6 mmHg s-1 [IQR; 3.6 – 6.0], 4.6 mmHg s-1 [IQR; 3.9 – 5.8] on T2 and 5.3 mmHg s^{-1} [IQR; 4.5 – 6.3] in the HC. Basal platelet respiration did not differ substantially between the three groups, whilst PBMC basal respiration was increased by approximately 80% in the T1 group when contrasted to T2 and the HC. fMtDNA was 14 times higher in the T1 group and 5 times higher in the T2 group when compared to the HC.

Conclusion:

fMtDNA levels were increased in COVID-19 patients, but were not associated with decreased mitochondrial O_2 consumption *in vivo* in the skin, and *ex vivo* in platelets or PBMC. This suggests the presence of mitochondrial stress, with concurrent preservation of mitochondrial respiration and function. It must be noted that due to the timing of T1, the optimal measurement window could have been missed. Therefore, the role of mitochondrial dysfunction in COVID-19 should be further evaluated at different time points.