Oncostatin M as a Biomarker to Predict the Outcome of V-V ECMO Supported Patients with Acute Pulmonary Failure

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PURPOSE

- Reliable biomarkers to predict the outcome of Veno-Venous Extracorporeal Membrane Oxygenation (V-V ECMO) therapy have not been identified.
- Although lactic acid (LA) levels are useful to predict the outcomes of Veno-Arterial (V-A) ECMO therapy in patients with cardiogenic shock, they are not reliable in V-V ECMO therapy in patients with acute pulmonary failure.
- To address this deficiency, we evaluated plasma levels of Oncostatin M (OSM), a member of Il-6 cytokine family.
- OSM is synthesized in neutrophils, macrophages, monocytes and T lymphocytes. Among these cells, neutrophils are unique as they store OSM in their granules that are readily degranulated upon activation, notably by inflammation and infection[1,2].
- **We hypothesize that plasma OSM levels could be a reliable biomarker to predict the outcomes of the V-V ECMO therapy.**

METHODS

- After obtaining informed consents, we collected blood samples on pre and on every other post-cannulation days until decannulation from 29 V-V ECMO patients. Plasma OSM levels were measured by ELISA and compared with plasma LA levels in concurrently collected samples.

RESULTS

- Plasma OSM release, consistent with a highly activated inflammatory state, was detected in 18 of the 29 patients prior to V-V ECMO. Of these 18 patients, 7 expired and 11 eventually recovered. As shown in Table 1 and Table 2 (mean±SEM (median)), their demography and pre-cannulation laboratory results respectively were similar, except their age (Student *t*-test).
- We examined the percentage of pre-decannulation plasma OSM and LA levels as compared to their respective pre-cannulation levels in these 18 patients.
- As shown in Fig. 1, the pre-decannulation OSM levels were significantly higher (Mann-Whitney U test: p=0.04) in patients who eventually expired than those who recovered (Median: 90.2% vs 49.4%). On the other hand, there was no significant difference in the LA levels (Mann-Whitney U test: p= 0.56) between those that eventually recovered and those who expired (Median: 82.7% vs 83.5%).

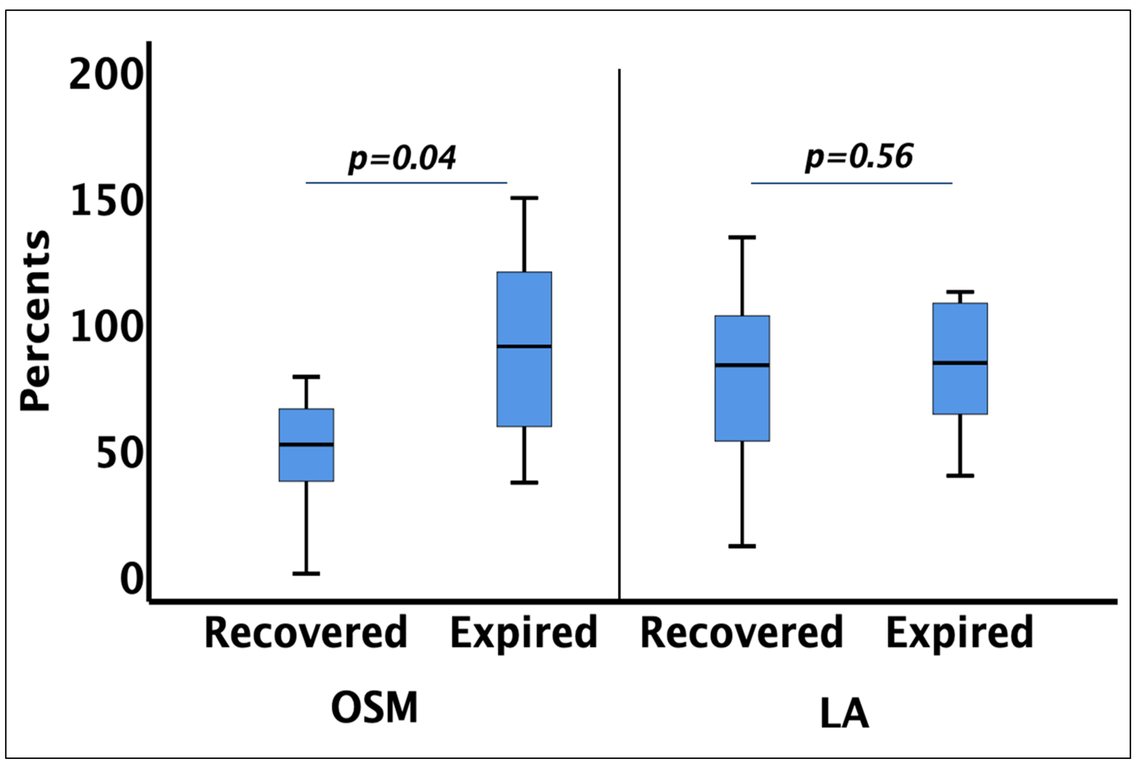
Table 1. Patient Demography

OSM Detected	Recovered	Expired	*p-value*
Age – yr	42.1±4.4	57.4±2.5	0.01
Gender – no. (%)			
Male	10(90.9)	4(57.1)	-
Female	1(9.1)	3(42.9)	-
Race – no. (%)			
Caucasian	10(90.9)	6(85.7)	-
Native American	1(9.1)	1(14.3)	-
Ethnicity – no. (%)			
Not Hispanic	11(100)	7(100)	-

Table 2. Pre-cannulation laboratory results

OSM Detected	Recovered	Expired	*p-value*
WBCs (x10^3/µL)	16.8±3.2 (13)	16.2±4.5 (12.9)	0.91
Platelet count (x10^3/µL)	200±26 (216)	312±77 (244)	0.20
Creatinine (mg/dl)	1.3±0.2 (1.1)	1.4±0.3 (1.2)	0.75
BUN (mg/dl)	34±5 (36)	43±16 (33)	0.46
Total Bilirubin (mg/dl)	1.2±0.4 (0.8)	1.6±0.6 (0.8)	0.53
AST (unit/L)	79±16 (73)	49±15 (42)	0.19
ALT (unit/L)	32±5 (34)	55±20 (23)	0.31
Lactic acid (mmol/L)	2.6±0.7 (1.7)	1.5±0.3 (1.4)	0.19
pH	7.3±0.03 (7.32)	7.4±0.02 (7.35)	0.11
pCO2 (mmHg)	45±3 (44)	58±11 (51)	0.31
pO2 (mmHg)	63±5 (58)	68±8 (66)	0.56
HCO3 (mEq/L)	23±1 (22.5)	33±5 (29)	0.11
O2 saturation (%)	85±3 (88)	89±4 (93)	0.36
SOFA score	11±1 (10)	11±2 (10)	0.88
Ejection fraction (%)	47±10 (55)	62±4 (60)	0.22

Figure 1



CONCLUSIONS

- Further studies are yet to address the underlining reasons why plasma OSM levels are undetected in a sub-population of patients with acute pulmonary failure.
- **Plasma OSM levels were predictive of mortality in patients with acute pulmonary failure supported by V-V ECMO whereas LA levels were not.**

REFERENCES

1. Rose-John S, Interleukin-6 family cytokines. Cold Spring Harb Perspect Biol 2018; 10(2).
2. Setiadi H, Yago T, Liu Z, McEver RP. Endothelial signaling by neutrophil-released oncostatin M enhances P-selectin-dependent inflammation and thrombosis. Blood Adv 2019; 3: 168-83.

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