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EOSINOPENIA: an early, effective and relevant COVID-19 biomarker?

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We have read with interest the article of Lippi *et al.* 'Eosinophil count in severe coronavirus disease 2019 (COVID-19)'.[1] The authors argue that there is an association between eosinophil count and COVID-19, but that eosinopenia appears not to be associated with the unfavourable progression of the disease.

Actually, there are not a lot of studies about this topic and those that exist relate to the Chinese case series. We report our case history relating to patients admitted to our COVID-19 Unit in our hospital in Brescia, one of the Northern Italian cities most affected by the SARS-Cov-2.

Eosinophils originate from CD34+stem cells in the bone marrow as terminally differentiated cells; in fact, they no longer proliferate once formed.[2,3] Under physiological conditions, the eosinophil count only covers a small percentage of circulating leukocytes, about 1–3%, but their levels may vary in different conditions.[4]

In the MERS-CoV, like in COVID-19, was demonstrated that patients had extensive inflammatory cellular infiltrates in the interstitium and alveoli[5] and, furthermore, they contribute to lung damage as they compromise lung function too.[2] Consequently, some authors speculated that probably neutrophils, eosinophilis, macrophages and lymphocytes migrate from peripheral blood into the lung tissue, causing neutropenia, eosinopenia lymphopenia.[6]

Also in Italian patients admitted to our Unit, it was shown a significant decrease in circulating eosinophils. In the 294 patients (M/F = 88/206; age range: 24-95 years; mean age: 68.8 years) admitted to our Unit, the median value of eosinophil count was 0.01×10^9/l (mean 0.028, SD ± 0.04). Moreover, it was shown that in 246 patients (83.7%) there was a decrease in circulating eosinophils (eosinophils < 0.05 10^9/l). Eosinophil count was correlated with active smoking (*P* values = 0.04), chronic obstructive pulmonary disease (*P* values = 0.037), haemoglobin levels (*P* values = 0.016), white blood cells (*P* values<0.01) and platelets (*P* values <0.01) counts.

The Welch two-sample *t*-test showed that the mean value of eosinophil was significantly smaller in deceased patients (*P* values = 0.032); the ANOVA (Analysis of Variance) analysis indicated also that eosinopenia had a weak association with the unfavourable progression of the disease (*P* values = 0.049) (Table 1).

Some authors have also speculated that the improvement of eosinopenia may be an indicator of COVID-19 improvement too, but more data will be needed to confirm this.[7,8]In conclusion, we think that the data obtained from our study confirm that the evaluation of the eosinophilic blood count represents a valid biomarker: the presence of eosinopenia can aid in early diagnosis of COVID-19, and it may be a useful tool in deciding whether

Table 1 Significant relationship between eosinophil count and status and severity

Status	Death	Mean = 0.022 (SD = 0.03)	Welch *t*-test
	Alive	Mean = 0.031 (SD = 0.05)	*P* = 0.032
Severity	0	Mean = 0.025 (SD = 0.03)	Kruskal–Wallis
	1	Mean = 0.032 (SD = 0.05)	test *P* = 0.049
	2	Mean = 0.019 (SD = 0.02)	

0 mild: no oxygen; 1 moderate: nasal cannulas, oxygen mask; 2 severe: NIV/BPAP/intubation.

to promptly isolate a patient and initiate specific therapies while waiting for confirmatory test results. Furthermore, persistent eosinopenia after admission correlated with prognostic evolution (high disease severity and low rates of recovery). Finally, influenza pneumonia and COVID-19 are two different types of respiratory viral pneumonia with very similar clinical manifestations, but eosinopenia may not be typically observed in patients with influenza pneumonia.

Conflict of interest: None declared.

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