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Simple Algorithm for Morphology of Blood Analysis (SAMBA) - artificial intelligence (AI) aided search for peripheral blood phenotypes on the example of pancreatic ductal adenocarcinoma (PDAC) cohort

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Introduction

During last years, the world was a whitness of the groundbreaking change in allergology. Thanks to the identification of eosinophils as the central cells in different allergic diseases and making them a goal for the treatment strategies. The aim of the study was to apply this way of thinking to the oncological cohort - to describe blood morphology profiles of the PDAC patients cohort in non-relative manner (using authorial Simple Algorithm for Morphology of Blood Analysis, SAMBA) and to propose possible its classification in the context of new EAACI cell-mediated hypersensitivity nomenclature.

Material and methods

152 treatment-naive patients with PDAC confirmed in postoperative material were included in the study; 67 of them underwent curative surgery (44,1%) while 85 (55,6%) were treated palliatively or underwent only surgical biopsy. We applied SAMBA algorithm with referece level: laboratory normal range for blood morphology; and analysis context: overall survival (OS - months).

Results

We have compared clinical features of the subgroups according to the laboratory normal ranges (below, within or above normal range for blood morphology parameters: eosinophils, EOS; basophils, BASO; monocytes, MONO; lymphocytes, LYMPH; neutrophils, NEU) and found no statistically significant differences in stage, grade, resection status. Then basing on the correlations (excluding correlates), Kaplan-Meier curves and CART tree for OS we proposed blood morphology phenotypes classification: exhausted (high MONO, NEU, CRP), lymphopenic, T2-low and balanced (median OS, n: 1,5, n=22; 4,5, n=12; 8,0, n=25; 10,0, n=94), which was independent prognostic factor for OS in best multivariate Cox regression model (with stage and Ca19-9 level).

Conclusions

We propose the following interpretation of the described blood morphology phenotypes: exhausted (T3-high): possible result of highly inflammatory tumor or concommittant infection (eg. billiary - due to stent use, secondary to the jaundice); lymphopenic (T1-low): of low lymphocyte anti-tumor activity; eosinopenic (T2-low): balanced in terms of main tumor inflammatory burden but poor in innate anti-tumor cell immunity, eg. T2-mediated; and balanced, optimal, of the best prognosis. Also, using clear and easy in interpretation algorithm can unify and accelerate preliminary research in immuno-oncology.