## **Coagulation in intracranial tumor**

Coagulation is an important aspect of the vascular microenvironment in which brain tumors evolve. Tumor patients often show aberrant coagulation and fibrinolysis activation. In particular, Glioblastoma (GBM), the most aggressive primary brain tumor, is associated with a state of hypercoagulability, and venous thromboembolism (VTE) is a common complication of this cancer and its treatment.

The aim of Navone et al. from the Laboratory of Experimental Neurosurgery and Cell Therapy, Neurosurgery Unit, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Postgraduate School in Radiodiagnostics Department of Neuroradiology, Milan, was to investigate the correlation between plasma von Willebrand Factor (VWF):Ag, permeability and perfusion MRI parameters, and examine their potential in predicting GBM patient prognosis.

They retrospectively analysed pre-operative DCE-, DSC-MRI, and VWF:Ag level of 26 GBM patients. They assessed the maximum values of relative cerebral blood flow (rCBF) and volume (rCBV), volume transfer constant Ktrans, plasma volume (Vp) and reflux rate constant between fractional volume of the extravascular space and blood plasma (Kep). Non-parametric Mann-Withney test and Kaplan-Meier survival analyses were conducted and a p-value<0.05 was considered statistically significant.

The median VWF:Ag value was 248 IU/dL and the median follow-up duration was about 13 months. They divided patients according to low- and high-VWF:Ag and found significant differences in the median follow-up duration (19 months vs 10 months, p=0.04) and in Ktrans (0.31 min-1 vs 0.53 min-1, p=0.02), and Kep (1.79 min-1 vs 3.89 min-1, p=0.005) values. The cumulative 1-year survival was significantly shorter in patients with high-VWF:Ag and high-Kep compared to patients with low-VWF:Ag and low-Kep (37.5% vs. 68%, p = 0.05).

These findings, in a small group of patients, suggest a role for VWF:Ag, similar to Ktrans, and Kep as a prognostic indicator of postoperative GBM patient survival <sup>1)</sup>.

A study from the same group aimed to investigate the clinical and prognostic significance of routine laboratory tests to assess the coagulative state of patients with brain tumors, in order to identify potential new prognostic factors and targets for personalized therapy.

Blood samples were collected from GBM (n=58) and meningioma (MNG, n=22) patients, before any treatment. The parameters analysed were: prothrombin time (PT), activated partial thromboplastin time (aPTT), D-Dimer (DD), fibrinogen (FB), von Willebrand factor (VWF), leukocyte count and haemoglobin levels.

Plasma levels of PT and aPTT were significantly reduced in GBMs compared to MNGs (p <0.05), whereas DD, VWF:Ag levels, and leukocyte count were significantly higher in GBMs than MNGs (p <0.01). Furthermore, we observed that GBM patients with reduced PT and aPTT and high levels of DD e VWF, defined as hypercoagulable patients, showed reduced overall survival (p<0.05) compared to non-hypercoagulable patients.

This data support the assumption that GBM patients show a plasma hypercoagulable profile and that coagulation profile is related to adverse outcome in patients with GBM. If confirmed,

hypercoagulability could play an important role as a prognostic factor of the disease and in the decision of an antithrombotic prophylaxis  $^{2)}$ .

1)

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