

Congress Abstract

CT Perfusion as a Biomarker of the Efficacy of Preoperative Treatment for Gastric Cancer

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Introduction: Given the difficulties in assessing response of the primary tumor and metastatic lesions in gastric cancer patients using standard RECIST 1.1 criteria, there is a need to search for new biomarkers to evaluate treatment efficacy, especially at early stages after therapy initiation. Perfusion computed tomography is a functional imaging technique that provides qualitative and quantitative information about tumor microcirculation and can serve as a tool for predicting or assessing treatment response, helping to optimize and individualize subsequent patient management.

Objective: To evaluate the role of perfusion CT (PCT) in monitoring response to neoadjuvant chemotherapy in patients with locally advanced gastric cancer.

Materials and Methods: The results of PCT in 28 patients aged 36 to 76 years with histologically confirmed gastric cancer who received combined treatment at the A.F. Tsyb Medical Radiological Research Center between June 2023 and June 2026 were analyzed. Baseline CT, supplemented by perfusion imaging, was performed before treatment initiation to assess tumor extent and obtain baseline perfusion parameters. Follow-up PCT was performed before surgery to evaluate treatment efficacy and changes in perfusion parameters.

Patients were divided into 2 groups: 12 of 28 patients with regression grade 1a/b according to the scale established by K. Becker (2003) were considered "responders" to neoadjuvant chemotherapy, and 16 of 28 patients with regression grade 2/3 were considered "non-responders." Quantitative PCT analysis was based on interpretation of perfusion parameter values automatically calculated from the region of interest (ROI) placed within the tumor. The following PCT parameters were analyzed: blood flow (BF), blood volume (BV), mean transit time (MTT), and permeability surface area (PS).

Results: The obtained perfusion data were subjected to both qualitative and quantitative analysis. Qualitative analysis included interpretation of parametric perfusion maps automatically generated by the software for each perfusion parameter. For each group, the significance of changes in each parameter was assessed using the paired Wilcoxon test. In patients who responded to treatment, a statistically significant decrease in BF, BV, and PS perfusion parameters was observed ($p < 0.05$). In patients who did not respond to treatment, none of the parameters changed significantly ($p > 0.1$ for all). Differences in BF and BV dynamics between groups were highly significant ($p < 0.01$), with significantly greater changes in responders. For PS, the difference was also significant ($p = 0.04$), although less pronounced. When

assessing the prognostic value of baseline PCT parameters, none of the parameters reached statistical significance ($p > 0.05$); only PS showed a weak trend toward lower values in the responder group.

Conclusion: CT perfusion parameters reflect tissue vascularization and can serve as objective quantitative biomarkers of tumor response to neoadjuvant treatment. Baseline low PS values are associated with a likelihood of clinical response to preoperative chemotherapy in gastric cancer. Further studies with larger sample sizes are needed to clarify the prognostic role of PCT.

Keywords: Gastric Cancer; Perfusion CT; Tumor Response Prediction; Neoadjuvant Chemotherapy