

## Prognostic Value of Cerebrospinal Fluid Tumor Cell Count in Leptomeningeal Disease from Solid Tumors

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**Abstract**

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### Abstract

**Objectives:**

Leptomeningeal disease (LMD) affects 5-10% of patients with solid tumors. Treatment decisions for LMD rely on patient risk stratification, since clinicians lack objective prognostic tools. The introduction of rare cell capture technology for identification of cerebrospinal fluid tumor cells (CSF-TCs) improved the sensitivity of LMD diagnosis, but prognostic value is unclear. This study assessed the prognostic value of CSF-TC density in patients with LMD from solid tumors, while determining an optimal CSF-TC density cutpoint for clinical-risk stratification.

**Methods:**

We conducted a single institution, retrospective cohort study of patients with newly diagnosed or previously treated LMD who had CNSide assay testing for CSF-TCs from 2020 to 2023. Univariable and multivariable survival analyses were conducted with Cox proportional-hazards modeling. Maximally-selected rank statistics were used to determine an optimal cutpoint for CSF-TC density and survival.

**Results:**

Of 31 patients, 29 had CSF-TCs detected on CNSide. Median CSF-TC density was 67.8 (interquartile range [IQR] = 4.7-639) TCs/mL. CSF cytology was positive in 16 of 29 patients with positive CNSide, and 0 of 2 patients with negative CNSide (CNSide diagnostic sensitivity = 93.5%, negative predictive value = 85.7%). Median survival from time of CSF-TC detection was 176 (IQR = 89-481) days. On univariable and multivariable analysis, CSF-TC density was significantly associated with survival (univariable hazard ratio [HR] = 1.39, 95% CI = 1.01-1.90, P = .04; multivariable HR = 1.50, 95% CI = 1.02-2.21, P = .04). An optimal cutpoint for dichotomizing survival by CSF-TC density was 19.34 TCs/mL. The time-dependent sensitivity and specificity for survival using this stratification were 76% and 67% at 6 months and 65% and 67% at 1 year, respectively.

**Conclusion(s):**

CSF-TC density may carry prognostic value in patients with LMD from solid tumors. Integrating CSF-TC density into LMD patient risk-stratification may help guide treatment decisions.