Association of circulating tumor cell dynamics with disease progression in stage i-iv melanoma

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Abstract

Background: Longitudinal monitoring of circulating tumor cells (CTC) may offer more prognostic value compared to assessments at a single timepoint.

Objective: To characterize CTC dynamics and evaluate association with disease progression among patients with stage I-IV melanoma.

Methods: Patients with ≥2 serial blood draws collected q6-12 months were included (2009-2024). CTCs were enumerated using CellSearch with ≥1 considered positive. CTC dynamics were categorized as persistently negative, ended on a negative or positive, or persistently positive. Kaplan-Meier method was used for survival estimates. Multivariable Cox proportional hazards model was fitted to identify predictors of disease progression.

Results: Of 403 patients, mean age was 64.1 years (SD14.2). Patients were 93.1% (375) non-Hispanic White, 64% (258) male, with predominantly stage III-IV disease (327, 81.1%). 32.3% (53) received neoadjuvant therapy, 90.6% (365) underwent primary tumor resection, and 89.5% underwent nodal dissection (118 completion lymph node dissection, 207 sentinel lymph node biopsy). In total, 1218 CTC assessments were performed with a median of 3 blood draws per patient (IQR2-4). 16.3% (229) had baseline blood draw within 3 months of diagnosis and 38.6% (141) had blood draw prior to surgery. Across serial CTC assessments, 22.6% (91) were persistently negative, 36.2% (146) ended on a negative CTC, 33.3% (134) ended on a positive CTC, and 7.9% (32) were persistently positive. There were no significant differences in age, gender, race, stage, and pathologic features by CTC dynamic. At a median follow-up of 39 months (95% CI:36.5-41.5), 202 (50.1%) recurred and 69 (17.1%) died. Patients who remained persistently negative had significantly longer progression-free survival compared to those who ended on a positive CTC or remained persistently positive (log-rank p=0.004). On multivariable Cox regression model adjusted for age and nodal burden, CTC dynamics that ended on a positive CTC or remained persistently positive were significant predictors of disease progression (HR 2.41, 95% CI:1.44-4.04 and HR 3.01, 95% CI:1.54-5.95, both p=0.001, respectively).

Conclusion: Longitudinal CTC assessments that ended on a positive CTC or remained persistently positive were significant predictors of melanoma disease relapse. Serial monitoring and characterization of CTC dynamics are necessary for more accurate risk stratification among patients with melanoma.

Do you have any conflicts of interest?

No, I do not have a conflict of interest.