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Prognostic Significance of Ki-67 Proliferation Index in Pulmonary Carcinoid Tumors: A Single-Center Retrospective Cohort Study

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BACKGROUND

Pulmonary carcinoid tumors are a rare neuroendocrine neoplasm classified as typical or atypical based on mitotic count and necrosis. Ki-67 is a well-established grading tool in gastroenteropancreatic neuroendocrine tumors, but prognostic value in pulmonary carcinoids remains less defined and is not part of the current WHO diagnostic criteria. We evaluated the association between Ki-67 index and clinical outcomes in a pulmonary carcinoid cohort at a single regional medical center.

METHODS

We conducted a retrospective cohort study of patients diagnosed with histologically confirmed pulmonary carcinoid tumors at Renown Regional Medical Center between January 2020 and December 2025. Patient demographics, tumor characteristics like Ki-67 proliferation markers, and clinical outcomes were collected and analyzed under IRB approval. Ki-67 values were categorized as low (≤5%) or elevated (>5%). Patients were classified as having stable disease if they were alive without documented recurrence or progression at last follow-up. Associations between Ki-67 category, histologic subtype, stable disease status, progression, and recurrence were assessed using Fisher's exact test.

RESULTS

A total of 56 patients were identified, including 45 (80.4%) with typical carcinoids and 11 (19.6%) with atypical carcinoids. Ki-67 was reported in 50 patients (89.3%). Elevated Ki-67 (>5%) was observed in 8 of 11 atypical tumors (72.7%) compared with 1 of 39 typical tumors (2.6%, $p<0.001$). Stable disease, defined as being alive without recurrence or progression at last follow-up, was more common among patients with Ki-67 ≤5% than among those with Ki-67 >5% (78% vs 11%, $p<0.001$). Patients with elevated Ki-67 demonstrated a higher rate of disease progression compared with those with low Ki-67 (33% vs 7%), although this difference did not reach statistical significance ($p=0.06$). Ki-67 was not associated with recurrence ($p=0.62$).

CONCLUSIONS

In a community-based cohort, elevated Ki-67 was strongly associated with atypical histology and adverse clinical outcomes including a lower likelihood of being alive without recurrence or progression at last follow-up with pulmonary carcinoid tumors. These findings support the potential utility of Ki-67 as a prognostic marker, and the concept that pulmonary carcinoids exist along a biologic continuum that may not be completely captured by the existing WHO framework and suggest that routine Ki-67 assessment could improve risk stratification. The incorporation of Ki-67 into pulmonary carcinoid classification in larger multicenter studies evaluating neuroendocrine tumor outcomes may assist in better identifying patients who may benefit from intensified surveillance or individualized management.

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