Survival Trends of Neuroendocrine Tumors and Associated Prognostic Factors

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Background: Neuroendocrine tumors (NETs) although slow growing can be fatal when advanced. In this population-based study, we aimed to evaluate the clinicopathological factors associated with survival of NET patients and also to examine changes in survival trends over time.

Methods: We identified NET cases diagnosed between 1973 and 2012 from the Surveillance, Epidemiology, and End Results (SEER) data. Patients were staged and assigned histological grades according to the SEER classification systems.

Results: 64,971 NET cases were included in the study. Median overall survival (OS) varied significantly by stage, grade, and age at diagnosis in addition to primary site and time interval of diagnosis (log rank $p < 0.001$ for all). Local stage was associated with better median OS (range in months: > 360 for appendix to 168 for small intestine) than regional (> 360 for appendix to 33 for unknown primary) or distant stage (70 for small intestine to 4 for colon). Grade 1 NETs had better OS (> 360 for appendix and rectum to 123 for cecum) compared to grade II (> 360 for appendix to 43 for colon) or grade 3 / 4 NETs (33 for small intestine NETs to 8 for cecum and colon). OS of all NETs improved from 2000-2004 to 2009-2012 (hazard ratio, HR 0.79, 95% CI 0.73 – 0.85). Stronger trends were noted in subgroups of distant stage gastrointestinal NETs (HR 0.71, 95% CI 0.62 – 0.81) and pancreatic NETs (HR 0.56, 95% CI 0.44 – 0.70) over this period.

Conclusion: Age, grade, stage and primary site are strong prognostic factors for OS in NETs. Survival for all NETs has improved over time, especially for distant stage gastrointestinal and pancreatic NETs reflecting improvement in therapies for them.

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