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## Demographic and Survival Outcomes in Early-Onset Pancreatic Neuroendocrine Tumors: A National Cancer Database Study

*Eugene C Nwankwo, Jr. MD, MS[1], Courtney Day, MS[2], Vinay Chandrasekhara MD[1], Jad P. AbiMansour, MD[1].*

*[1]Division of Gastroenterology and Hepatology, Department of Medicine, Mayo Clinic, Rochester, Minnesota, USA; [2]Division of Clinical Trials and Biostatistics, Department of Quantitative Health Sciences, Mayo Clinic College of Medicine and Science, Rochester, Minnesota, USA.*

### BACKGROUND

Pancreatic neuroendocrine tumors (pNETs) have been observed in younger adults, though epidemiologic trends remain poorly defined. This study aimed to characterize demographic predictors, treatment patterns, and survival disparities in early-onset pNET (EOPNET) using national data.

### METHODS

We analyzed the National Cancer Database (2012–2021) for patients with pNET. EOPNET was defined as diagnosis at age < 50. Multivariable logistic regression and Cox models assessed predictors of EOPNET and all-cause mortality among patients with pNET, adjusting for demographics, tumor features, treatment, and socioeconomic factors. Trends in diagnosis and survival by income and urbanicity were examined using chi-square and trend tests.

### RESULTS

Among 4,576 pNET cases, 953 (20.8%) were EOPNET, with a median age of 42 (IQR 35–46). The proportion of EOPNET was stable over time. Compared to late onset pNET, EOPNET patients were more likely to be female (49.7% vs. 43.5%), Black (16.9% vs. 10.7%), Hispanic (11% vs. 6.2%), and have private insurance (73.2% vs. 40.9%) or Medicaid (13% vs. 5.8%) (all $p < 0.001$). They had fewer comorbidities (Charlson-Deyo 0–1: 95% vs. 89.5%, $p < 0.0001$) and higher rates of surgical resection (82.7% vs. 72.1%, $p < 0.001$). There were no differences in tumor grade, stage, or receipt of chemotherapy/radiation. In multivariable analysis of patients with pNETs, diagnosis at an early age (EOPNET) was independently associated with improved overall survival (HR 0.56, 95% CI 0.45–0.70). In contrast, Medicaid (HR 1.71, 95% CI 1.32–2.22), Medicare (HR 2.04, 95% CI 1.76–2.37), and uninsured status (HR 1.65, 95% CI 1.10–2.47) — all compared to private insurance — as well as grade III disease (HR 4.01, 95% CI 3.30–4.87), increasing clinical T stage (HR 1.69–2.80 for cT2–cT4 vs. cT1, 95% CI 1.42–3.59), and N stage (HR 1.67–4.22 for cN1–cN2 vs. cN0, 95% CI 1.42–10.35) were significantly associated with worse survival. 10-year overall survival for patients with neuroendocrine EOPC was 81.7% (95% CI 75.9-85.7%) compared to late onset pNET 60.1% (95% CI 57.0%-63.1%), $p<0.001$.

### CONCLUSIONS

EOPNET constitutes a distinct clinical subgroup marked by younger age, greater racial and ethnic diversity, and higher rates of surgical intervention. Despite comparable tumor characteristics, early-

onset disease is independently associated with improved survival, highlighting the importance of age-specific approaches to pNET management.

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