

Background

- Early-onset (EO) are clinically distinct from typical-onset (TO) neuroendocrine neoplasms (NEN) patients ^{1,2,3,4}
- More of localized stage in EONEN ^{1,3}
- More of grade 1-2 / well-moderately differentiated in EONEN ^{1,3,4}
- Majority of EONEN are women vs majority of TONEN are men ^{1,2,3}
- Our previous analysis showed increasing incidence rates EONEN ⁵
- California's diverse population, comprehensive cancer registry can help uncover distinct clinical details by race and ethnicity

Methods

- Aims
 - Compare the sociodemographic, clinical, and tumor features in patients diagnosed with EONEN and with TONEN
 - Assess for inequities by subpopulations
 - Explore the effect of age on pathogenesis
- Data
 - Patients with malignant NET or NEC diagnosed 1992-2019 in the population-based California Cancer Registry
 - Define EO as diagnosed by age 49
 - Define TO as diagnosed from age 50
 - Histology ICD-O-3 codes 8013 (large cell NE carcinoma), 8041-5 (small cell NE carcinoma, combined), 8150-5 (pancreatic endocrine tumor, insulinoma, glucagonoma, gastrinoma, mixed pancreatic tumor), 8240-9 (carcinoid tumor, enterochromaffin cell, goblet cell, mixed adenoneuroendocrine carcinoma)
 - All primary organ sites and histologic subtypes
 - All grades
- Statistics
 - Age-adjusted incidence rate per 100,000 persons-years (AIR)
 - Pearson chi-squared tests comparing proportions by age groups
 - Score tests proportions linearly increasing/decreasing over time

Results

120,126 NEN patients all ages diagnosed at

- 53% Commission On Cancer 
- 10% National Cancer Institute 
- 5% National Comprehensive Cancer Network 
- 2% Veterans Affairs 
- 43% Other hospital

Results

Table 1. Patient and clinical features by onset age

N (%)	Onset age (years)		p-value
	≤49	≥50	
Total	12,266 (10%)	107,860 (90%)	
Sex			<0.001
Male	5,560 (45)	55,185 (51)	
Female	6,706 (55)	52,675 (49)	
Age at diagnosis; med [IQR]	43 [36-47]	69 [61-76]	NA
Race and ethnicity			<0.001
American Indian	79 (1)	550 (1)	
Asian American Pacific Islander	1,210 (10)	7,497 (7)	
Hispanic	3,336 (28)	13,165 (12)	
NH Black	1,129 (9)	7,572 (7)	
NH White	6,269 (52)	78,107 (73)	
Tumor stage			<0.001
Localized	5,447 (50)	25,445 (27)	
Locoregional	2,292 (21)	19,657 (21)	
Distant metastatic	3,179 (29)	49,595 (52)	
Primary subsite/histologic subtype			<0.001
Stomach	665 (5)	2,905 (3)	
Small intestine	980 (8)	7,136 (7)	
Appendix	1,433 (12)	1,408 (1)	
Colon	538 (4)	3,251 (3)	
Rectum	1,797 (15)	6,792 (6)	
Pancreas	1,265 (10)	4,985 (5)	
LC/SC lung	1,945 (16)	52,707 (49)	
Pulmonary	1,634 (13)	11,185 (10)	
Other	2,009 (16)	17,447 (16)	

Figure 1a. Changing compositions in EONEN over time

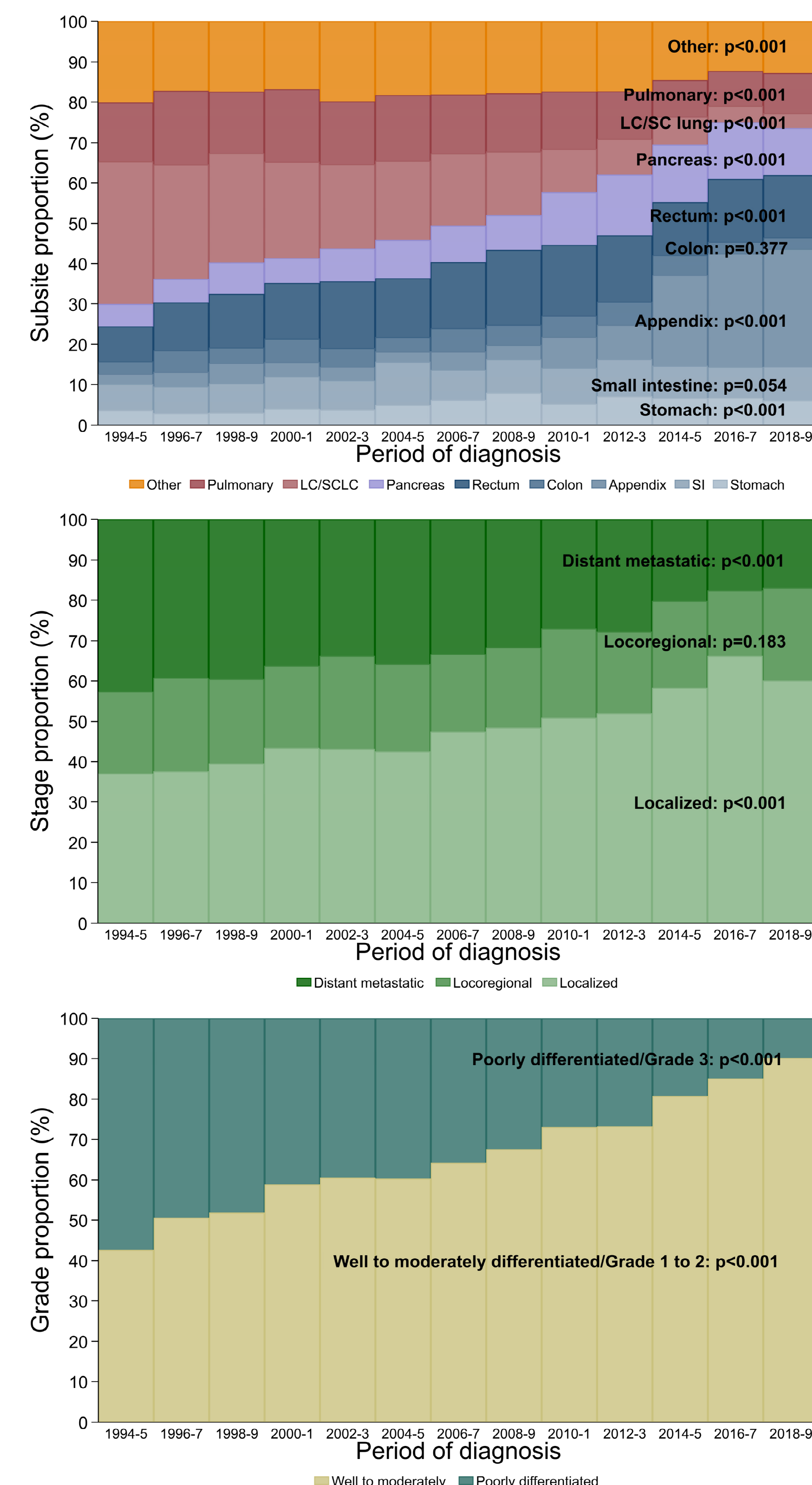


Table 2. Incidence rates [95% CI] of EONEN subsites differ by race and ethnicity

	Stomach	SI	Colon	Rectum	Appendix	Pancreas	Pulmonary	Other
Asian/Pacific Islander	0.05 [0.04,0.06]	0.05 [0.04,0.07]	0.06 [0.05,0.08]	0.40 [0.36,0.44]	0.06 [0.05,0.08]	0.18 [0.15,0.21]	0.19 [0.16,0.21]	0.25 [0.22,0.28]
Hispanic	0.16 [0.14,0.17]	0.11 [0.10,0.13]	0.07 [0.06,0.08]	0.25 [0.23,0.27]	0.17 [0.15,0.18]	0.15 [0.13,0.17]	0.28 [0.25,0.30]	0.26 [0.24,0.28]
Non-Hispanic Black	0.13 [0.10,0.17]	0.30 [0.25,0.36]	0.13 [0.10,0.17]	0.43 [0.37,0.50]	0.15 [0.12,0.19]	0.19 [0.15,0.23]	0.78 [0.70,0.86]	0.39 [0.33,0.45]
Non-Hispanic White	0.06 [0.05,0.07]	0.17 [0.16,0.19]	0.08 [0.07,0.09]	0.17 [0.16,0.19]	0.26 [0.25,0.28]	0.21 [0.19,0.22]	0.75 [0.72,0.78]	0.29 [0.27,0.31]

Boldface indicates the highest age-adjusted incidence rate per primary subsite

Figure 2. Odds ratio [95% CI] of localized vs distant stage EONEN

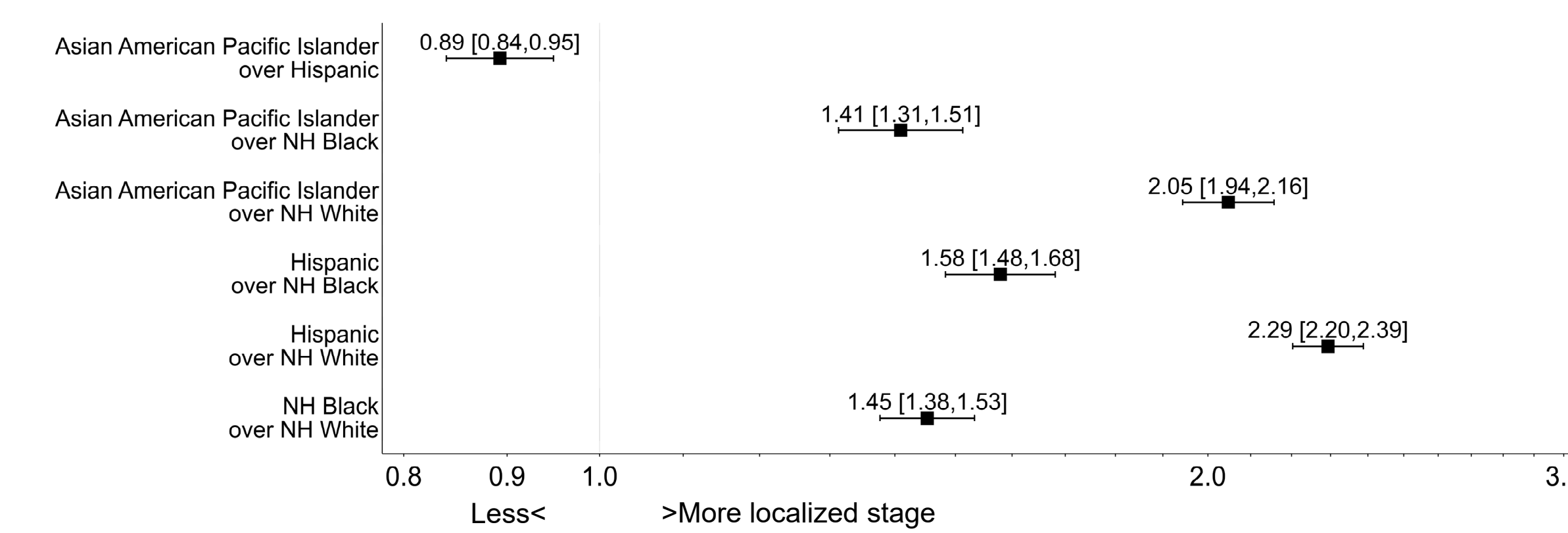
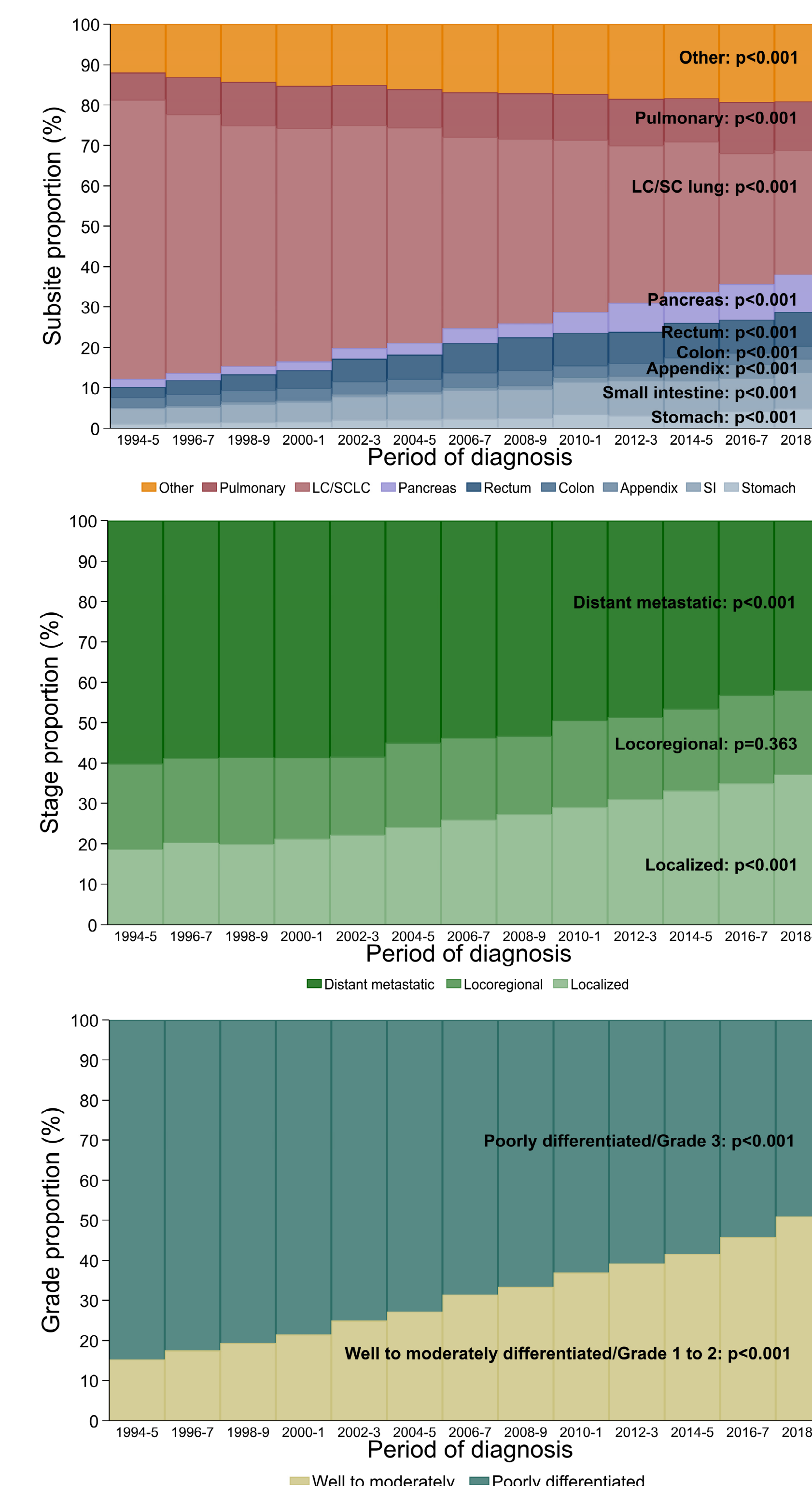


Figure 1b. Changing compositions in TONEN over time



- Early onset patients differ from typical onset in
 - Sex
 - Race and ethnicity
 - Primary subsite
 - Tumor stage
 - Grade or differentiation

Conclusions

- Younger patients differ from older patients in many ways (Table 1)
 - More women than men
 - More Hispanic population
 - More localized stage
 - More appendix subsite
 - Less large cell or small cell lung NEN subsite
 - More grade 1-2 / well-moderately differentiated (Fig 1)
- Rates of subsites, stages, grades changing over time (Fig 1)
- Subtypes of EONEN differ by racial and ethnic groups (Table 2)
 - Highest age-adjusted incidence rates for
 - Stomach EONEN in Hispanic population
 - Pancreas, appendix EONEN in NH White population
 - Pulmonary, small intestine, colon, rectum in NH Black
 - Proportions of localized stage EONEN (Fig 2)
 - Largest in Hispanic population
 - Smallest in NH White population
- Disease characteristics changing over time both EO, TO (Fig 1)
 - Less LC/SC lung
 - Less distant stage
 - Less poorly differentiated/grade 3
- Further research is underway to understand the causes and clinical implications of these findings

References

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4. Shi M et al Cancer Control 2012;
5. Paciorek A et al JNCCN 2025

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