Transatlantic differences in Survival for Major Salivary Gland Cancer: Europe vs. United States

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Abstract

Educational Objective:
To compare relative survival for major salivary gland cancer between Europe and the United States, as well as regions within Europe.

Objectives: To determine the relative survival (RS) rates for major salivary gland cancer in Europe, and to compare those with rates for the United States (U.S.).

Study Design: Retrospective database analysis.

Methods: The EUROCARE and the Surveillance, Epidemiology, and End Results (SEER) databases were queried for cases of major salivary gland cancer reported between 2000 and 2007. The number of cases and RS values were obtained. Cases were broken down by age groups and gender. EUROCARE results were also broken down by country and geographic region.

Results: A total of 23,941 cases of major salivary gland cancer were identified, 16,191 in Europe and 7,750 in the U.S. RS for the U.S. (1-year:88.5%,5-year:72.1%) was greater than that of Europe overall (1-year:82.0%,5-year: 61.3%), and that of all European regions (p<0.05). Eastern Europe (1-year:72.9%,5-year: 50.5%) had the lowest, and Northern Europe (1-year:85.5%,5-year:67.1%) had the highest RS within Europe (p<0.05). For the U.S., 1-year RS was greater than 16 of 29 European countries (p<0.05), and 5-year RS was greater than 19 of 29 European countries (p<0.05). In all regions, females had higher RS when compared to males. Older patients generally had lower RS when compared to younger patients.

Conclusions:
Survival for major salivary gland cancer varies between European regions, and between the U.S. and Europe. Patients in the U.S. have better survival than their European counterparts, except in certain countries. Eastern European patients have the worst survival. The reasons for these variations in survival deserve examination.

Introduction

- Major salivary gland cancer (M-SGC) is a rare group of malignancies. They comprise 3-6% of all of head neck cancers[1], and their incidence in the United States (U.S) is estimated to be 1.2 cases per 100,000 per year.[2]
- They are a heterogeneous group of malignancies, comprised of at least 20 histologically distinct neoplasms.[2,3] The demographic characteristics of patients with M-SGC vary with the histologic subtype.[4,5] Exposure to ionizing radiation is a widely accepted risk factor, but the roles of smoking[6], alcohol consumption[7], occupational exposures[7], ultraviolet radiation[8], and viral infections[8] are less well-defined.
- Given the epidemiologic diversity of these malignancies, and the advanced level of care that may be necessary for optimal treatment, incidence and survival for M-SGC would be expected to vary between countries and geographic regions. Multiple U.S. based retrospective population-database studies of M-SGC survival, most of which used the Surveillance, Epidemiology, and End Results (SEER) database, have been reported. However, no similar population-based studies have been performed for all of Europe.

Methods and Materials

- The EUROpean CAncer REgistry (EUROCARE) and the Surveillance, Epidemiology, and End Results (SEER) databases were queried for cases of HNC reported between 2000 and 2007.
- International Classification of Disease for Oncology 3 (ICD-O-3) topographical codes C07.9-C08.9 were used to select major salivary gland tumors (parotid gland, submandibular gland, sublingual gland, overlapping lesion of major salivary gland, major salivary gland NOS). Patients with hematologic malignancies were excluded using ICD-O-3 morphologic codes 9590-9989.
- Patients <15 years of age were excluded. All Death Certificate Only (DCO) cases were also excluded.
- Cases were stratified by age, gender, anatomic site, and extent of disease. The EUROCARE results were further stratified by country and geographic region.
- RS was calculated by dividing overall survival (actuarial method) by expected cumulative survival. Expected cumulative survival was calculated using the Ederer II method. All survival analyses were performed using SEER*Stat.

Results

- A total of 23,941 cases of major salivary gland cancer diagnosed between 2000 and 2007 were identified: 16,191 in EUROCARE-5, and 7,750 in SEER. **Table 1** lists the demographic distributions of M-SGC in Europe and the United States.
- One and five year RS for the U.S. and Europe is illustrated in **Figure 1**.
- As demonstrated in Table 1, at five years, the U.S. was the country with the best 5-year RS (72.1%), followed by Norway (70.6%), Finland (69.8%), and Malta (68.9%). These RS rates are not statistically significantly different. However, Germany (64.0%), France (63.8%), and England (62.3%) are significantly behind the U.S. and other top countries in 5-year RS (**p<0.05**).

Table 1. Demographics of Salivary Gland Cancer

	Europe Overall		Central Europe		U.K. & Ireland		Southern Europe		Eastern Europe		Northern Europe		United States	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	16,191		3,949		4,572		2,885		2,805		1,980		7,750	
Age groups														
15-44 years	2,212	13.7%	540	13.7%	718	15.7%	378	13.1%	312	11.1%	264	13.3%	1,247	16.1%
45-54 years	2,191	13.5%	522	13.2%	555	12.1%	407	14.1%	443	15.8%	264	13.3%	1,195	15.4%
55-64 years	3,286	20.3%	810	20.5%	849	18.6%	560	19.4%	663	23.6%	404	20.4%	1,433	18.5%
65-74 years	3,747	23.1%	904	22.9%	994	21.7%	693	24.0%	721	25.7%	435	22.0%	1,548	20.0%
75+ years	4,755	29.4%	1,173	29.7%	1,456	31.8%	847	29.4%	666	23.7%	613	31.0%	2,327	30.0%
Gender														
Male	9,078	56.1%	2,206	55.9%	2,610	57.1%	1,675	58.1%	1,575	56.1%	1,012	51.1%	4,513	58.2%
Female	7,113	43.9%	1,743	44.1%	1,962	42.9%	1,210	41.9%	1,230	43.9%	968	48.9%	3,237	41.8%

Table 2. Relative Survival by country (%)

Country	5-year	CI LL	CI UL
United States	72.1	70.7	73.5
Norway	70.6	64.1	77.8
Finland	69.8	64.2	75.8
Malta	68.9	43.8	100.0
Switzerland	67.4	58.2	78.1
Sweden	66.5	62.1	71.3
The Netherlands	66.3	62.5	70.3
Slovenia	66.1	55.6	78.4
Wales	66.0	58.6	74.3
Germany	64.0	60.6	67.5
France	63.8	57.8	70.5
Denmark	63.5	57.5	70.2
Estonia	62.7	52.1	75.5
England	62.3	60.2	64.5
Belgium	62.0	56.8	67.7
Spain	61.2	54.9	68.2
Portugal	60.9	55.6	66.7
Croatia	60.5	54.8	66.8
Italy	60.4	57.4	63.5
Northern Ireland	59.8	49.3	72.6
Ireland	58.6	50.9	67.6
Scotland	58.0	51.4	65.5
Czech Republic	57.4	53.1	61.9
Austria	56.7	51.6	62.4
Poland	55.1	49.2	61.8
Lithuania	48.2	41.7	55.7
Iceland	47.4	22.9	98.4
Slovakia	45.3	39.3	52.2
Bulgaria	41.7	36.9	47.2
Latvia	40.9	32.4	51.7

CI LL, lower limit of 95 percentile confidence interval; CI UL, upper limit of 95 percentile confidence interval

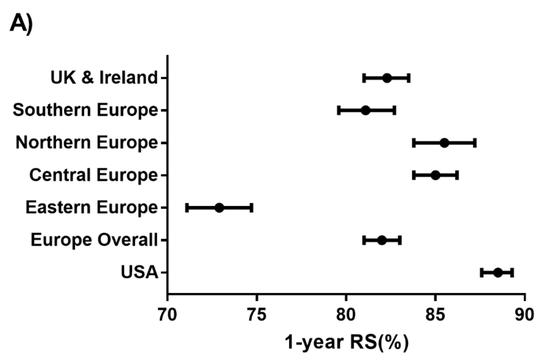

Figure 1. Label in 20pt Calibri.

Discussion

- Our results, which demonstrate superior M-SGC RS rates in most U.S. demographics compared to most European regions and countries, may seem to contradict current international public health sentiment ranking American healthcare as inferior to healthcare in many European countries. However, our observations corroborate numerous other studies which find that the U.S. has higher survival rates of various solid tumor types compared to Europe. The World Health Organization ranks the U.S. as 31st in the world in health system quality, behind 15 of the countries covered by EUROCARE.
- However, we find that M-SGC 5-year RS is significantly higher in the U.S. than most of these countries, Sweden, Switzerland, Malta, Norway, and Finland being the exceptions.
- Previous studies have shown that Adenoid Cystic Carcinoma is the most common salivary gland cancer histology in Europe, whereas Mucoepidermoid Carcinoma, which typically has a worse prognosis, is the most common histology in the U.S.
- Despite this, the U.S. has greater RS than most European countries. This suggests that histology alone are unlikely to account for the differences in RS.
- Further studies with histology, staging, and treatment modality information are needed to investigate these differences.

Conclusions

- Relative survival for major salivary glands in the U.S. is greater than in Europe, but much of this may be due to the lower survival seen in Eastern European nations.

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