



World-wide trends in net survival from pancreatic cancer by morphological sub-type: An analysis of 1,258,329 adults diagnosed in 58 countries during 2000–2014 (CONCORD-3)

Maja Nikšić^{a,g,1}, Melissa Matz^{b,*}, Mikhail Valkov^c, Rafael Marcos-Gragera^{d,e,f}, Charles Stiller^h, Stefano Rossoⁱ, Michel P. Coleman^b, Claudia Allemani^b, on behalf of the CONCORD Working Group²

^a Department of Non-Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

^b Cancer Survival Group, Department of Non-Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

^c Department of Radiology, Radiotherapy and Oncology, Northern State Medical University, Arkhangelsk, Russia

^d Epidemiology Unit and Girona Cancer Registry, Catalan Institute of Oncology (ICO), IDIBGI, Oncology Coordination Plan, Department of Health Government of Catalonia, 17004, Girona, Spain

^e University of Girona (UdG), Girona, 17004, Spain

^f CIBER of Epidemiology and Public Health (CIBERESP), Madrid, Spain

^g Centre for Health Services Studies, University of Kent, Canterbury

^h National Disease Registration Service, NHS Digital, London, UK

ⁱ Piedmont Cancer Registry, A.O.U. Città della Salute e della Scienza di Torino, Turin, Italy

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ABSTRACT

Background: Ductal adenocarcinomas and neuroendocrine tumours are the two main morphological sub-types of pancreatic cancer. Using data from CONCORD-3, we examined whether the distribution of morphological sub-types could help explain international variations in pancreatic cancer survival for all morphologies combined. We also examined world-wide survival trends from pancreatic cancer, by morphological sub-type and country.

Methods: We estimated age-standardised one- and five-year net survival by country, calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014) and morphological sub-type, using data from 295 population-based cancer registries in 58 countries for 1,258,329 adults (aged 15–99 years) diagnosed with pancreatic cancer during 2000–2014 and followed up until 31 December 2014.

Results: Carcinomas were by far the most common morphological sub-type, comprising 90% or more of all pancreatic tumours in all countries. Neuroendocrine tumours were rare, generally 0–10% of all tumours. During 2010–2014, age-standardised one-year net survival ranged from 10% to 30% for carcinomas, while it was much higher for neuroendocrine tumours (40% to 80%). Age-standardised five-year survival was generally poor (less than 10%) for carcinomas, but it ranged from 20% to 50% for neuroendocrine tumours.

Conclusions: Survival from pancreatic carcinoma remains poor world-wide and trends showed little improvement during 2000–2014. Despite slight declines in the proportion of carcinomas, they continue to comprise the majority of pancreatic tumours. Increases in survival from neuroendocrine tumours were greater than those for carcinomas, indicating that enhancements in diagnostic techniques and treatments have helped improve survival over time.

* Corresponding author.

E-mail address: melissa.matz@lshtm.ac.uk (M. Matz).

¹ Contributed equally to this work.

² Members listed at the end of the article.

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1. Introduction

Pancreatic ductal adenocarcinomas and pancreatic neuroendocrine tumours are the two main morphological sub-types of pancreatic cancer. Arising from exocrine cells in the pancreas, pancreatic ductal adenocarcinomas are the commonest sub-type, comprising around 85% of all pancreatic cancers. Pancreatic neuroendocrine tumours, which originate in islet cells of the pancreas, comprise only 3–4% of all pancreatic cancers [1–3].

The majority of exocrine pancreatic tumours are diagnosed at advanced stages due to lack of obvious symptoms during early-stage disease, effective population-based screening programmes, aggressive behaviour of tumours [4]. Symptoms for exocrine tumours, such as jaundice, weight loss, abdominal pain, loss of appetite and fatigue, are usually only present in advanced-stage disease, and are often attributed to other illnesses, such as pancreatitis or ulcers. Thus, five-year survival from these tumours is very poor (less than 5%) [2,4].

Pancreatic neuroendocrine tumours are either functional or non-functional, depending on whether the tumour produces hormones (e. g., insulin). Functional tumours may cause symptoms before the tumour has grown or spread due to the increase in hormones, while patients with non-functional tumours generally only have symptoms after the tumour has grown or spread to other areas of the body [3]. The majority of neuroendocrine tumours are functional (60–70%) [1]. Five-year survival from neuroendocrine tumours is relatively high (50–60%) [1, 5].

Given the high proportion of aggressive pancreatic ductal adenocarcinomas, pancreatic cancer survival for all morphological sub-types combined is poor world-wide. The CONCORD programme established global surveillance of cancer survival in 2015 with CONCORD-2 [6], which has since been updated with the publication of CONCORD-3 [7]. CONCORD-3 included data on over 37.5 million cancer patients diagnosed with one of 18 common cancers, contributed by 322 population-based cancer registries in 71 countries. CONCORD-3 reported some variation in five-year survival from pancreatic cancer between countries, ranging from 5% to 15% world-wide: 5-year survival was highest in Asia, while survival was less than 15% in all other countries. Trends in pancreatic cancer survival from 2000–2004 to 2010–2014 were generally flat, though survival did increase by 3–5% for some countries [7].

Previous studies examining the distribution of morphological sub-types have been limited to one country [5,8]. Additionally, studies examining survival have been limited to either one morphological sub-type or to one country or region, if including more than one morphological sub-type [5,9–11]. Using data from all 295 population-based registries participating in CONCORD-3 that submitted data on pancreatic cancer, we examined whether the distribution of morphological sub-types could help explain international variations in survival. Additionally, we provided estimates of survival from pancreatic cancer, by morphological sub-type, by country and over time.

2. Methods

We estimated age-standardised one- and five-year net survival by country, calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014) and morphological sub-type, using data from 295 population-based cancer registries in 58 countries for 1,258,329 adults (aged 15–99 years) diagnosed with pancreatic cancer during 2000–2014.

We included only primary, invasive tumours (ICD-O-3 behaviour code 3) in the analysis. If a patient was diagnosed with two or more primary, invasive tumours of the pancreas, then only the first record was included. Patients whose cancer registration was from a death certificate or autopsy only were excluded, because their true survival time was unknown. Follow-up data on the patient's vital status were available until 31 December 2014.

We defined three morphological sub-types based on the WHO classification of tumours of the digestive system [1] and on the *International Classification Diseases of Oncology*, 3rd edition [12] (ICD-O-3) morphological codes: carcinomas, neuroendocrine tumours and other specified tumours (Table 1). Tumours with non-specific morphology (ICD-O-3 codes 8000–8005) were included in carcinomas. A separate category for tumours with unknown morphology was also defined. We included all tumours regardless of whether the cancer registry reported the tumour as morphologically verified. If a tumour was reported by the registry as not morphologically verified but had a specific ICD-O-3 code (i.e., any code except 8000–8005), then we recoded this tumour as morphologically verified, because a specific morphology code implies that morphological verification had been completed.

Net survival was estimated using the Pohar Perme estimator [13]. Net survival is the probability of a cancer patient to survive their cancer up to a given time since diagnosis, e.g. one year, after controlling for competing risks of death (background mortality), which are higher in the elderly. To account for the differences in background mortality between regions and over time, we used life tables of all-cause mortality that were specific to each region, single year of age, sex, calendar year and, where possible, race or ethnic group. The Pohar Perme estimator was implemented using *stsur* [14] in Stata version 15.

We used the cohort approach [15] to estimate net survival for patients diagnosed during 2000–2004 and 2005–2009, because at least one year of follow-up data were available for all patients by the end of 2014 for the estimation of one-year survival, and at least five years of follow-up data were available for the estimation of five-year survival. We used the period approach [16] to estimate survival for patients diagnosed during 2010–2014, because five years of follow-up data were not available for all patients by 31 December 2014.

We produced survival estimates for five age groups (15–44, 45–54, 55–64, 65–74 and 75–99 years) and obtained age-standardised estimates for all ages combined, using the International Cancer Survival Standard (ICSS) weights [17]. If an age-specific estimate could not be produced, or fewer than 10 patients were available for analysis in an age group, data for adjacent age groups were pooled and the re-estimated survival was used for both of the original age groups. If two or more age-specific estimates could not be produced, or fewer than 10 patients were available for analysis in two or more age groups, only the

Table 1
Morphological sub-types.

Description	ICD-O-3 Morphology
Carcinoma (including ductal and non-specific)	8000–8005; 8010–8012; 8014–8015; 8020–8022; 8030–8035; 8040; 8042; 8045–8046; 8050; 8052; 8070–8076; 8082–8084; 8090–8091; 8094; 8120–8122; 8130; 8140–8145; 8147–8148; 8160; 8162–8163; 8170–8171; 8180; 8190; 8200–8201; 8210–8211; 8221; 8230–8231; 8245; 8250–8253; 8255; 8260–8263; 8265; 8290; 8310; 8312–8313; 8320; 8323; 8331; 8337; 8340–8342; 8344–8345; 8350; 8370; 8380; 8400–8401; 8408; 8410; 8420; 8430; 8440–8441; 8450; 8452–8453; 8460–8461; 8470–8473; 8480–8482; 8490; 8500–8501; 8503–8504; 8507–8508; 8510; 8512; 8514; 8520–8525; 8530; 8543; 8550–8552; 8560; 8562; 8570–8573; 8575–8576
Neuroendocrine tumours	8013; 8041; 8043–8044; 8150–8156; 8240–8244; 8246; 8248–8249; 8360; 8574
Other specified morphologies	8680; 8683; 8693; 8700; 8720; 8743; 8800–8806; 8810–8811; 8814–8815; 8825; 8830; 8840; 8850–8852; 8854–8855; 8857–8858; 8890–8891; 8896; 8900–8901; 8920; 8930; 8933–8936; 8940–8941; 8950; 8963; 8970–8971; 8980; 8982; 8990; 9015; 9040–9041; 9043–9044; 9050–9052; 9064–9065; 9070; 9080–9081; 9100; 9120; 9130; 9133; 9150; 9170; 9231; 9240; 9250–9251; 9260; 9342; 9363–9364; 9370; 9473; 9540; 9560; 9581
Unknown morphology	9999

Table 2

Number and proportion of eligible cases excluded due to death certificate or autopsy only registration by country and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014): adults (15–99 years) diagnosed with pancreatic cancer.

	Country	Calendar Period	No.	%
AFRICA				
	Algeria (3 registries)	2000–2004	–	–
		2005–2009	9	6.2
		2010–2014	13	11.5
	Mauritius*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	South Africa (Eastern Cape)	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
AMERICA (CENTRAL AND SOUTH)				
	Argentina (3 registries)	2000–2004	127	38.6
		2005–2009	506	37.8
		2010–2014	430	44.2
	Brazil (6 registries)	2000–2004	720	27.1
		2005–2009	159	9.7
		2010–2014	20	1.7
	Chile (4 registries)	2000–2004	16	12.2
		2005–2009	18	9.0
		2010–2014	15	9.2
	Colombia (3 registries)	2000–2004	58	17.1
		2005–2009	41	10.3
		2010–2014	78	14.4
	Costa Rica*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Ecuador (5 registries)	2000–2004	92	31.3
		2005–2009	193	31.8
		2010–2014	143	23.5
	Guadeloupe (France)*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Martinique (France)*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Puerto Rico*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Uruguay*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
AMERICA (NORTH)				
	Canada (10 registries)	2000–2004	850	4.9
		2005–2009	952	4.8
		2010–2014	788	4.0
	United States (49 registries)	2000–2004	6703	4.8
		2005–2009	7618	4.6
		2010–2014	6754	4.5
ASIA				
	China (21 registries)	2000–2004	16	0.7
		2005–2009	168	2.1
		2010–2014	240	2.8
	Cyprus*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	India (Karunagappally)	2000–2004	–	–

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Table 2 (continued)

	Country	Calendar Period	No.	%
		2005–2009	1	2.0
		2010–2014	1	1.7
	Israel*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Japan	2000–2004	7488	32.5
	(16 registries)	2005–2009	11,727	25.3
		2010–2014	5202	15.0
	Jordan*	2000–2004	2	1.1
		2005–2009	1	0.3
		2010–2014	8	1.6
	Korea*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Kuwait*	2000–2004	–	–
		2005–2009	3	3.2
		2010–2014	2	2.1
	Malaysia (Penang)	2000–2004	–	–
		2005–2009	9	3.8
		2010–2014	–	–
	Qatar*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Singapore*	2000–2004	42	4.9
		2005–2009	61	5.2
		2010–2014	34	2.1
	Taiwan*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Thailand	2000–2004	70	7.5
	(6 registries)	2005–2009	62	4.5
		2010–2014	50	4.2
	Turkey	2000–2004	28	4.1
	(9 registries)	2005–2009	114	3.5
		2010–2014	104	2.8
EUROPE				
	Austria*	2000–2004	–	–
		2005–2009	1094	15.0
		2010–2014	–	–
	Belgium*	2000–2004	1	0.1
		2005–2009	3	0.1
		2010–2014	4	<0.1
	Croatia*	2000–2004	312	10.5
		2005–2009	413	12.3
		2010–2014	–	–
	Czech Republic*	2000–2004	704	8.4
		2005–2009	235	2.4
		2010–2014	119	1.1
	Denmark*	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
	Estonia*	2000–2004	78	7.9
		2005–2009	88	7.4
		2010–2014	50	6.7
	Finland*	2000–2004	381	9.1
		2005–2009	537	10.6
		2010–2014	–	–

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Table 2 (continued)

	Country	Calendar Period	No.	%
France	(15 registries)	2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
Germany	(10 registries)	2000–2004	6534	31.6
		2005–2009	858	12.2
		2010–2014	778	13.4
Iceland*		2000–2004	1	0.7
		2005–2009	3	2.0
		2010–2014	–	–
Ireland*		2000–2004	126	6.6
		2005–2009	86	3.7
		2010–2014	40	2.0
Italy	(44 registries)	2000–2004	264	1.4
		2005–2009	371	1.3
		2010–2014	174	1.5
Latvia*		2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
Lithuania*		2000–2004	76	3.3
		2005–2009	–	–
		2010–2014	–	–
Malta*		2000–2004	25	10.7
		2005–2009	–	–
		2010–2014	–	–
Netherlands*		2000–2004	71	0.9
		2005–2009	55	0.6
		2010–2014	48	0.4
Norway*		2000–2004	58	1.9
		2005–2009	198	5.7
		2010–2014	111	3.0
Poland*	(16 registries)	2000–2004	405	4.1
		2005–2009	793	4.9
		2010–2014	71	0.4
Portugal*	(4 registries)	2000–2004	10	0.4
		2005–2009	10	0.3
		2010–2014	–	–
Romania (Cluj)		2000–2004	–	–
		2005–2009	–	–
		2010–2014	–	–
Russian Federation	(5 registries)	2000–2004	58	2.4
		2005–2009	49	1.3
		2010–2014	85	2.0
Slovakia*		2000–2004	–	–
		2005–2009	473	11.9
		2010–2014	26	3.0
Slovenia*		2000–2004	88	7.0
		2005–2009	51	3.2
		2010–2014	30	2.1
Spain	(9 registries)	2000–2004	346	7.4
		2005–2009	217	4.1
		2010–2014	104	3.0
Sweden*		2000–2004	329	7.2
		2005–2009	224	4.9
		2010–2014	159	2.7
Switzerland	(9 registries)	2000–2004	157	6.5
		2005–2009	95	3.4
		2010–2014	87	3.0

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Table 2 (continued)

	Country	Calendar Period	No.	%
	United Kingdom*	2000–2004	2156	6.4
		2005–2009	2010	5.4
		2010–2014	1649	3.8
OCEANIA	Australia*	2000–2004	347	3.5
		2005–2009	576	4.6
		2010–2014	561	4.5
	New Zealand*	2000–2004	183	10.9
		2005–2009	251	11.7
		2010–2014	273	10.5

* Data with 100% coverage of the national population.

unstandardised, all ages combined estimated was reported.

The pooled estimates for countries with more than one registry do not include data from registries for which the estimates were less reliable. However, if data were only available for one registry in a given country or territory, less reliable estimates are shown with a flag in figures and tables because they provide the only available information from that country or territory.

The CONCORD-3 protocol, the ethical approvals and the data quality control procedures have been described elsewhere [7].

3. Results

The proportion of patients registered only from a death certificate or at autopsy varied over time and between countries (Table 2). For most countries, the proportion of death certificate or autopsy only registrations decreased over time. Of the 1,258,329 adults included in the analysis, 75.7% had tumours that were reported by the registry as morphologically verified or had a specific morphology code. The proportion of tumours morphologically verified, however, varied between countries and over time (Table 3): during 2010–2014, it was only 24.2% in Chile but 100% in Kuwait. The proportion of tumours that were morphologically verified generally increased over time. In 20 of the 58 countries, the proportion of morphologically verified tumours increased by 10% or more from 2000–04 to 2010–14. In 17 countries, this proportion decreased, but the decrease was less than 10% in all but 4 countries. Given that a specific morphology code was required for a tumour to be categorised as either a neuroendocrine tumour or a tumour with other specified morphologies, 100% of these tumours were morphologically verified. For carcinomas, however, tumours with non-specific morphology were included in this sub-type. Thus, the proportion of tumours morphologically verified differed between countries, but generally it increased over time. All carcinomas were morphologically verified in 10 countries in 2010–2014, while morphological verification was less than 50% in seven countries.

The distribution of the known morphological sub-types varied between countries and over time (Fig. 1). Carcinomas were by far the most common morphological sub-type, comprising around 90% or more of all pancreatic tumours in all countries. Neuroendocrine tumours were rare, generally 0–10% of all tumours. Tumours with other specified morphologies were extremely rare, only comprising of less than 1% of all tumours.

The highest proportion of tumours reported as carcinoma was 100% in South Africa in 2010–2014 (Table 4), though the majority of these carcinomas were non-specific (Supplementary Table 1), and none were morphologically verified (Table 3).

In 2010–2014, the proportion of carcinomas was the lowest in Norway (89.9%). The proportion of carcinomas decreased over time in all but eight countries (South Africa, Argentina, Martinique, Uruguay, Malaysia, France, Romania and Sweden). The proportion of

neuroendocrine tumours was highest in Norway (10.0%) and lowest in Uruguay (0.6%) (Table 4). This proportion increased over time in all but eight countries (Argentina, Martinique, Uruguay, India, Malaysia, France, Romania and Sweden). The proportion of neuroendocrine tumours increased more than 5% in 29 countries (Algeria; Guadeloupe and Martinique; Canada and the United States; seven countries in Asia; 16 countries in Europe; and Australia), with consequent decreases in the proportion of carcinomas in all but two of these countries (Martinique and France).

The proportion of tumours with other specified morphologies remained extremely small (1% or less) throughout 2000–2014 (Table 4): it was relatively stable over time in 18 countries and it decreased slightly in 16 countries. Eight countries had slight increases in the proportion of other specified morphologies. The highest proportion of other specified morphologies was in Algeria and Argentina (1.1%).

The proportion of tumours with unknown morphology decreased over time in 21 countries, while it increased in five countries (Supplementary Table 2). Unknown morphology was the second commonest morphological group in countries that reported tumours of this sub-type, though its proportion varied widely between countries. In 2010–2014, unknown morphology was highest in Croatia (49.8%).

3.1. Carcinomas

Age-standardised one-year net survival from carcinomas was generally poor, ranging from 10% to 30% (Table 5, Fig. 2). One-year survival for adults diagnosed during 2010–2014 was highest in Kuwait (40.3%, 95% CI: 29.6–51.1%) and lowest in the Russian Federation (14.9%, 13.5–16.4%). Improvements in one-year survival were modest, with increases of less than 5% in 10 countries (Canada; Malaysia, Taiwan, Turkey; five countries in Europe; and New Zealand), 5–10% in 12 countries (Martinique; United States; Korea; eight countries in Europe; and Australia) and more than 10% in eight countries (Kuwait and Singapore; and six countries in Europe). One-year survival decreased over time in Chile; China and Thailand; Croatia, Iceland, Russian Federation and Slovakia.

Age-standardised five-year survival from carcinomas was less than 10% for adults diagnosed during 2010–2014 in all countries except Kuwait (21.0%, 95% CI: 9.7–32.4%) and Malaysia (17.6%, 10.6–24.6%) (Table 6, Fig. 3). During the same calendar period, five-year survival was lowest in Norway (3.9%, 2.9–4.9%). Five-year survival increased by less than 5% in 27 countries (Martinique; Canada and the United States; Korea, Singapore, Taiwan and Turkey; 18 countries in Europe; Australia and New Zealand) and more than 10% in Kuwait, Malaysia and Sweden. Five-year survival decreased over time in seven countries (Chile; China and Thailand; Croatia, Iceland, Poland and the Russian Federation). There was some variation world-wide in age-standardised five-year survival from carcinomas (Fig. 4).

Table 3

Morphological verification (MV) by sub-type, country and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014): adults (15–99 years) diagnosed with pancreatic cancer.

	Period of diagnosis	Carcinomas						Unknown morphology		Unknown morphology				All morphologies combined		All morphologies combined					
		MV		Non-MV		Unknown MV		MV	Unknown morphology				MV	Non-MV		Unknown MV					
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
AFRICA																					
Algeria (3 registries)	2000–2004	22	100.0	–	–	–	–	–	–	13	72.2	5	27.8	–	–	22	55.0	13	32.5	5	12.5
	2005–2009	99	100.0	–	–	–	–	–	–	31	93.9	2	6.1	–	–	101	75.4	31	23.1	2	1.5
	2010–2014	85	100.0	–	–	–	–	–	–	7	100.0	–	–	–	–	91	92.9	7	7.1	–	–
Mauritius*	2000–2004	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	32	71.1	13	28.9	–	–	–	–	–	–	–	–	–	–	32	71.1	13	28.9	–	–
South Africa (Eastern Cape)	2000–2004	–	–	21	100.0	–	–	–	–	–	–	–	–	–	–	–	–	21	100.0	–	–
	2005–2009	3	13.6	19	86.4	–	–	–	–	–	–	–	–	–	–	3	13.6	19	86.4	–	–
	2010–2014	–	–	19	100.0	–	–	–	–	–	–	–	–	–	–	–	–	19	100.0	–	–
AMERICA (CENTRAL AND SOUTH)																					
Argentina (3 registries)	2000–2004	146	87.4	19	11.4	2	1.2	–	–	27	100.0	–	–	–	–	151	75.9	46	23.1	2	1.0
	2005–2009	595	82.6	116	16.1	9	1.3	–	–	113	100.0	–	–	–	–	614	72.1	229	26.9	9	1.1
	2010–2014	421	78.7	106	19.8	8	1.5	–	–	57	100.0	–	–	–	–	435	71.8	163	26.9	8	1.3
Brazil (6 registries)	2000–2004	1069	47.6	1175	52.3	3	0.1	–	–	–	–	–	–	–	–	1094	48.2	1175	51.7	3	0.1
	2005–2009	1549	79.9	386	19.9	3	0.2	–	–	–	–	–	–	–	–	1608	80.5	386	19.3	3	0.2
	2010–2014	979	72.1	377	27.8	2	0.1	–	–	–	–	–	–	–	–	1050	73.5	377	26.4	2	0.1
Chile (4 registries)	2000–2004	51	57.3	38	42.7	–	–	–	–	51	100.0	–	–	–	–	51	36.4	89	63.6	–	–
	2005–2009	158	39.4	243	60.6	–	–	–	–	46	100.0	–	–	–	–	166	36.5	289	63.5	–	–
	2010–2014	45	32.6	93	67.4	–	–	–	–	57	100.0	–	–	–	–	48	24.2	150	75.8	–	–
Colombia (3 registries)	2000–2004	170	50.7	165	49.3	–	–	–	–	–	–	–	–	–	–	172	51.0	165	49.0	–	–
	2005–2009	223	52.1	205	47.9	–	–	–	–	–	–	–	–	–	–	231	53.0	205	47.0	–	–
	2010–2014	–	–	273	62.5	164	37.5	–	–	20	26.7	55	73.3	–	–	–	311	58.7	219	41.3	–
Costa Rica*	2000–2004	124	43.4	162	56.6	–	–	–	–	–	–	–	–	–	–	129	44.3	162	55.7	–	–
	2005–2009	254	56.2	198	43.8	–	–	–	–	–	–	–	–	–	–	269	57.6	198	42.4	–	–
	2010–2014	243	59.3	166	40.5	1	0.2	–	–	–	–	–	–	–	–	263	61.2	166	38.6	1	0.2
Ecuador (5 registries)	2000–2004	101	50.0	101	50.0	–	–	–	–	–	–	–	–	–	–	101	50.0	101	50.0	–	–
	2005–2009	190	47.6	209	52.4	–	–	–	–	–	–	–	–	–	–	199	48.8	209	51.2	–	–
	2010–2014	221	49.6	225	50.4	–	–	–	–	–	–	–	–	–	–	234	51.0	225	49.0	–	–
Guadeloupe (France)*	2000–2004	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	39	81.3	9	18.8	–	–	–	–	–	–	–	–	–	–	43	82.7	9	17.3	–	–
	2010–2014	77	72.6	29	27.4	–	–	–	–	–	–	–	–	–	–	86	74.8	29	25.2	–	–
Martinique (France)*	2000–2004	89	100.0	–	–	–	–	–	–	35	92.1	3	7.9	–	–	100	72.5	35	25.4	3	2.2
	2005–2009	106	100.0	–	–	–	–	–	–	81	98.8	1	1.2	–	–	114	58.2	81	41.3	1	0.5
	2010–2014	80	100.0	–	–	–	–	–	–	52	100.0	–	–	–	–	87	62.6	52	37.4	–	–

(continued on next page)

Table 3 (continued)

	Period of diagnosis	Carcinomas						Unknown morphology	Unknown morphology						All morphologies combined	All morphologies combined					
		MV		Non-MV		Unknown MV		MV	MV		Non-MV		Unknown MV		MV	MV		Non-MV		Unknown MV	
		No.	%	No.	%	No.	%		No.	%	No.	%	No.	%		No.	%	No.	%	No.	%
Puerto Rico*	2000–2004	576	94.1	36	5.9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	666	84.7	110	14.0	10	1.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	477	93.2	26	5.1	9	1.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Uruguay*	2000–2004	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	257	42.3	351	57.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	397	41.6	557	58.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
AMERICA (NORTH)																					
Canada (10 registries)	2000–2004	10,488	67.3	4702	30.2	397	2.5	–	–	224	100.0	–	–	–	–	–	–	–	–	–	–
	2005–2009	12,597	70.7	4803	27.0	–	–	412	2.3	–	–	240	100.0	–	–	–	–	–	–	–	–
	2010–2014	13,616	78.2	2221	12.8	–	–	1564	9.0	–	–	175	100.0	–	–	–	–	–	–	–	–
United States (49 registries)	2000–2004	115,432	90.5	9247	7.2	2918	2.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	134,166	90.6	10,172	6.9	3678	2.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	122,137	91.8	8122	6.1	2730	2.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ASIA																					
China (21 registries)	2000–2004	819	34.3	1570	65.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	2307	29.5	5502	70.4	4	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	2472	29.1	6026	70.9	3	<0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cyprus*	2000–2004	24	75.0	6	18.8	2	6.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	164	83.7	29	14.8	3	1.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	261	94.9	12	4.4	2	0.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–
India (Karunagappally)	2000–2004	10	37.0	17	63.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	15	30.0	35	70.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	33	58.9	23	41.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Israel*	2000–2004	1610	64.6	835	33.5	49	2.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	1982	73.4	716	26.5	3	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	2003	79.7	503	20.0	6	0.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Japan (16 registries)	2000–2004	7713	54.0	5950	41.7	614	4.3	–	–	1093	99.9	1	0.1	–	–	–	–	–	–	–	–
	2005–2009	18,459	58.0	12,599	39.6	794	2.5	–	–	2424	99.1	23	0.9	–	–	–	–	–	–	–	–
	2010–2014	15,041	56.4	10,889	40.8	738	2.8	–	–	2324	98.6	32	1.4	–	–	–	–	–	–	–	–
Jordan*	2000–2004	150	89.8	17	10.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	249	92.2	21	7.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	403	83.8	78	16.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Korea*	2000–2004	5748	41.3	8156	58.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	9551	49.8	9610	50.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2010–2014	16,600	66.6	8320	33.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Kuwait*	2000–2004	54	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	91	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 3 (continued)

	Period of diagnosis	Carcinomas						Unknown morphology	Unknown morphology						All morphologies combined	All morphologies combined					
		MV		Non-MV		Unknown MV		MV	MV		Non-MV		Unknown MV		MV	MV		Non-MV		Unknown MV	
		No.	%	No.	%	No.	%		No.	%	No.	%	No.	%		No.	%	No.	%	No.	%
	2010–2014	85	100.0	-	-	-	-	-	-	-	-	-	-	-	92	100.0	-	-	-	-	
Malaysia (Penang)	2000–2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	2005–2009	129	82.2	28	17.8	-	-	-	-	-	-	-	-	135	82.8	28	17.2	-	-	-	
	2010–2014	118	64.5	65	35.5	-	-	-	-	-	-	-	-	121	65.1	65	34.9	-	-	-	
Qatar*	2000–2004	34	97.1	1	2.9	-	-	-	-	-	-	-	-	35	97.2	1	2.8	-	-	-	
	2005–2009	47	90.4	4	7.7	1	1.9	-	-	-	-	-	-	48	90.6	4	7.5	1	1.9	-	
	2010–2014	62	69.7	27	30.3	-	-	-	-	-	-	-	-	70	72.2	27	27.8	-	-	-	
Singapore*	2000–2004	483	71.6	192	28.4	-	-	-	-	121	100.0	-	-	502	61.6	313	38.4	-	-	-	
	2005–2009	758	99.7	2	0.3	-	-	-	-	312	100.0	-	-	792	71.6	314	28.4	-	-	-	
	2010–2014	1153	100.0	-	-	-	-	-	-	307	100.0	-	-	1253	80.3	307	19.7	-	-	-	
Taiwan*	2000–2004	3346	100.0	-	-	-	-	-	-	2024	100.0	-	-	3438	62.9	2024	37.1	-	-	-	
	2005–2009	4555	100.0	-	-	-	-	-	-	2477	100.0	-	-	4739	65.7	2477	34.3	-	-	-	
	2010–2014	6310	100.0	-	-	-	-	-	-	2751	100.0	-	-	6854	71.4	2751	28.6	-	-	-	
Thailand (6 registries)	2000–2004	400	54.9	328	45.1	-	-	-	-	-	-	-	-	404	55.2	328	44.8	-	-	-	
	2005–2009	527	39.0	822	60.9	1	0.1	-	-	-	-	-	-	541	39.7	822	60.3	1	0.1	-	
	2010–2014	523	45.3	632	54.7	-	-	-	-	-	-	-	-	556	46.8	632	53.2	-	-	-	
Turkey (9 registries)	2000–2004	426	65.6	205	31.6	18	2.8	-	-	-	-	-	-	435	66.1	205	31.2	18	2.7	-	
	2005–2009	2242	76.2	616	20.9	86	2.9	11	10.2	86	79.6	11	10.2	2354	74.7	702	22.3	97	3.1	-	
	2010–2014	2894	84.0	485	14.1	68	2.0	3	4.1	63	86.3	7	9.6	3092	83.2	548	14.8	75	2.0	-	
EUROPE																					
Austria*	2000–2004	4928	93.7	313	6.0	16	0.3	-	-	-	-	-	-	5096	93.9	313	5.8	16	0.3	-	
	2005–2009	5300	89.9	484	8.2	111	1.9	-	-	-	-	-	-	5521	90.3	484	7.9	111	1.8	-	
	2010–2014	5615	86.5	609	9.4	269	4.1	-	-	-	-	-	-	5952	87.1	609	8.9	269	3.9	-	
Belgium*	2000–2004	840	83.2	170	16.8	-	-	-	-	-	-	-	-	895	84.0	170	16.0	-	-	-	
	2005–2009	5008	89.4	592	10.6	-	-	-	-	-	-	-	-	5378	90.1	592	9.9	-	-	-	
	2010–2014	6416	87.1	951	12.9	-	-	-	-	-	-	-	-	7029	88.1	951	11.9	-	-	-	
Croatia*	2000–2004	1608	100.0	-	-	-	-	-	-	374	36.1	663	63.9	1627	61.1	374	14.0	663	24.9	-	
	2005–2009	1626	99.8	4	0.2	-	-	-	-	489	39.1	763	60.9	1674	57.1	493	16.8	763	26.0	-	
	2010–2014	1405	99.8	3	0.2	-	-	-	-	729	48.7	767	51.3	1503	50.1	732	24.4	767	25.5	-	
Czech Republic*	2000–2004	3870	100.0	-	-	-	-	-	-	3652	100.0	-	-	3971	52.1	3652	47.9	-	-	-	
	2005–2009	4533	100.0	-	-	-	-	-	-	4674	100.0	-	-	4766	50.5	4674	49.5	-	-	-	
	2010–2014	5601	100.0	-	-	-	-	-	-	4620	100.0	-	-	5939	56.2	4620	43.8	-	-	-	
Denmark*	2000–2004	2708	71.2	1043	27.4	55	1.4	-	-	-	-	-	-	2787	71.7	1043	26.8	55	1.4	-	
	2005–2009	3779	85.2	638	14.4	17	0.4	-	-	-	-	-	-	3882	85.6	638	14.1	17	0.4	-	
	2010–2014	4155	88.2	525	11.1	32	0.7	-	-	-	-	-	-	4300	88.5	525	10.8	32	0.7	-	
Estonia*	2000–2004	455	100.0	-	-	-	-	-	-	443	100.0	-	-	462	51.0	443	49.0	-	-	-	
	2005–2009	494	100.0	-	-	-	-	-	-	582	100.0	-	-	515	46.9	582	53.1	-	-	-	

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Table 3 (continued)

	Period of diagnosis	Carcinomas						Unknown morphology		Unknown morphology				All morphologies combined				All morphologies combined			
		MV		Non-MV		Unknown MV		MV		MV		Non-MV		Unknown MV		MV		Non-MV		Unknown MV	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Portugal* (4 registries)	2000–2004	1440	92.0	118	7.5	8	0.5	–	–	568	97.6	14	2.4	–	–	1522	68.3	686	30.8	22	1.0
	2005–2009	2197	84.8	298	11.5	96	3.7	–	–	628	97.2	18	2.8	–	–	2360	69.4	926	27.2	114	3.4
	2010–2014	1901	92.2	125	6.1	36	1.7	–	–	408	99.0	4	1.0	–	–	2100	78.6	533	19.9	40	1.5
Romania (Cluj)	2000–2004	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2005–2009	157	61.8	97	38.2	–	–	–	–	–	–	–	–	–	–	171	63.8	97	36.2	–	–
	2010–2014	168	58.7	118	41.3	–	–	–	–	–	–	–	–	–	–	177	60.0	118	40.0	–	–
Russian Federation (5 registries)	2000–2004	752	98.6	11	1.4	–	–	58	3.8	1467	95.6	9	0.6	–	–	829	35.8	1478	63.8	9	0.4
	2005–2009	1698	96.9	30	1.7	24	1.4	74	4.0	1738	93.7	43	2.3	–	–	1800	49.5	1768	48.6	67	1.8
	2010–2014	2615	99.9	2	0.1	–	–	39	2.8	1348	95.7	22	1.6	–	–	2725	66.5	1350	33.0	22	0.5
Slovakia*	2000–2004	1492	66.6	747	33.4	–	–	–	–	–	–	–	–	–	–	1539	67.3	747	32.7	–	–
	2005–2009	2391	70.1	1021	29.9	–	–	–	–	–	–	–	–	–	–	2468	70.7	1021	29.3	–	–
	2010–2014	562	68.0	263	31.8	1	0.1	–	–	–	–	–	–	–	–	585	68.9	263	31.0	1	0.1
Slovenia*	2000–2004	596	100.0	–	–	–	–	4	0.8	525	99.2	–	–	–	–	638	54.9	525	45.1	–	–
	2005–2009	789	100.0	–	–	–	–	–	–	699	100.0	–	–	–	–	845	54.7	699	45.3	–	–
	2010–2014	652	100.0	–	–	–	–	–	–	656	100.0	–	–	–	–	710	52.0	656	48.0	–	–
Spain (9 registries)	2000–2004	2300	83.6	427	15.5	25	0.9	–	–	1339	95.8	58	4.2	–	–	2442	56.9	1766	41.2	83	1.9
	2005–2009	3054	88.0	393	11.3	25	0.7	–	–	1465	98.7	19	1.3	–	–	3199	62.7	1858	36.4	44	0.9
	2010–2014	2080	90.2	215	9.3	10	0.4	–	–	872	99.3	6	0.7	–	–	2257	67.2	1087	32.4	16	0.5
Sweden*	2000–2004	3564	87.1	526	12.9	–	–	–	–	–	–	–	–	–	–	3715	87.6	526	12.4	–	–
	2005–2009	3853	91.2	374	8.8	–	–	–	–	–	–	–	–	–	–	3980	91.4	374	8.6	–	–
	2010–2014	4640	84.6	847	15.4	–	–	–	–	–	–	–	–	–	–	4798	85.0	847	15.0	–	–
Switzerland (9 registries)	2000–2004	1523	81.3	349	18.6	1	0.1	–	–	266	100.0	–	–	–	–	1599	72.2	615	27.8	1	<0.1
	2005–2009	1943	84.4	359	15.6	–	–	–	–	236	100.0	–	–	–	–	2066	77.6	595	22.4	–	–
	2010–2014	2107	87.4	303	12.6	2	0.1	–	–	248	100.0	–	–	–	–	2265	80.4	551	19.6	2	0.1
United Kingdom* (4 registries)	2000–2004	27,799	86.8	4044	12.6	173	0.5	–	–	1581	94.8	86	5.2	–	–	28,379	82.8	5625	16.4	259	0.8
	2005–2009	30,476	84.3	5585	15.4	92	0.3	–	–	1659	97.0	51	3.0	–	–	31,429	81.0	7244	18.7	143	0.4
	2010–2014	33,653	81.5	7084	17.2	531	1.3	–	–	1896	98.7	25	1.3	–	–	35,519	78.8	8980	19.9	556	1.2
OCEANIA																					
Australia* (8 registries)	2000–2004	7272	81.2	1506	16.8	181	2.0	–	–	407	99.0	4	1.0	–	–	7518	78.2	1913	19.9	185	1.9
	2005–2009	8981	81.7	1777	16.2	236	2.1	–	–	383	99.2	3	0.8	–	–	9405	79.7	2160	18.3	239	2.0
	2010–2014	9177	84.5	1590	14.6	94	0.9	–	–	263	97.0	8	3.0	–	–	9944	83.6	1853	15.6	102	0.9
New Zealand*	2000–2004	667	45.9	782	53.8	4	0.3	–	–	–	–	–	–	–	–	703	47.2	782	52.5	4	0.3
	2005–2009	860	46.6	982	53.3	2	0.1	–	–	–	–	–	–	–	–	903	47.9	982	52.0	2	0.1
	2010–2014	1055	47.6	1162	52.4	–	–	–	–	–	–	–	–	–	–	1157	49.9	1162	50.1	–	–

* Data with 100% coverage of the national population.

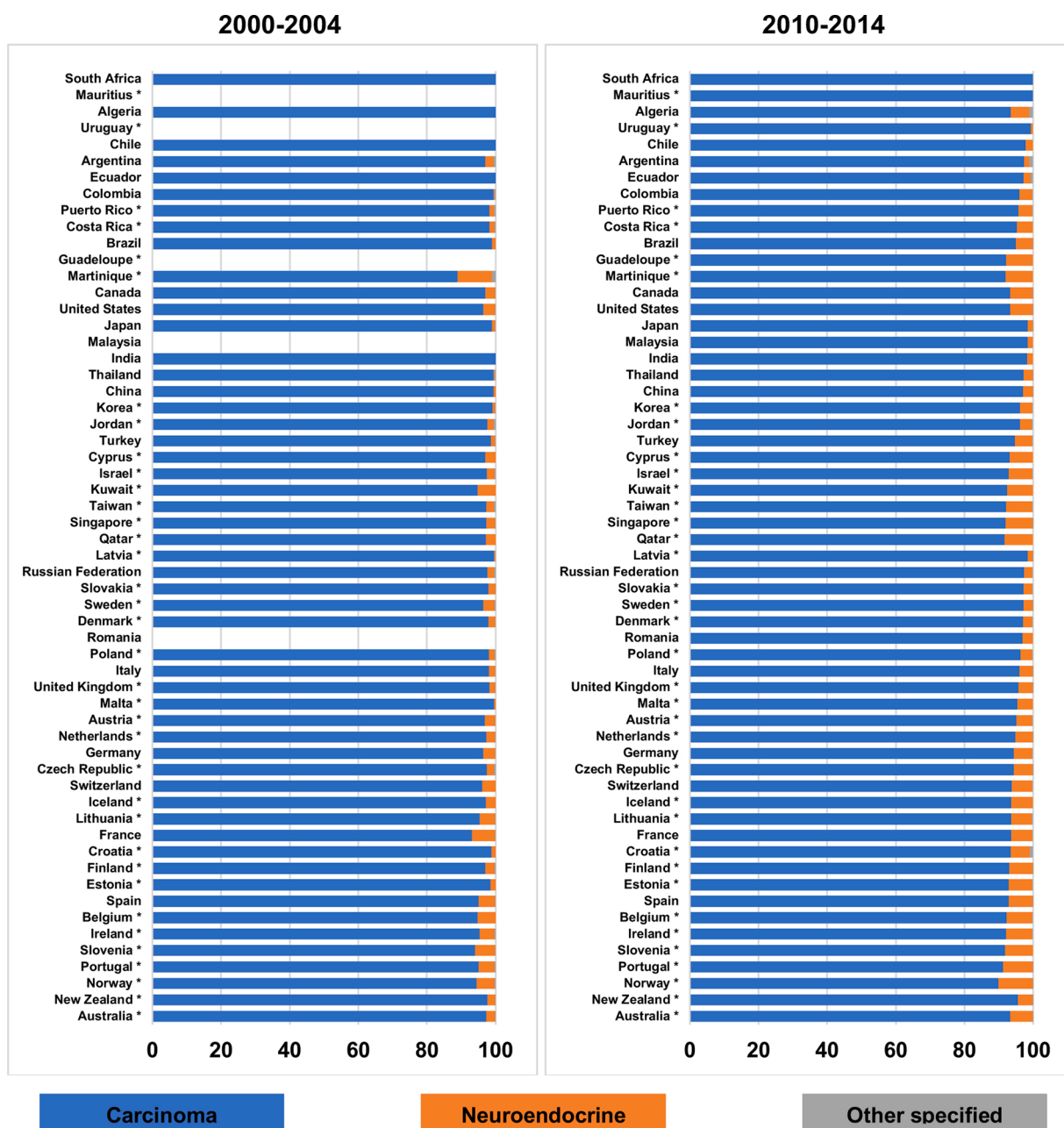


Fig. 1. Distribution (%) of morphological sub-type by calendar period (2000–2004 and 2010–2014) and country: adults (15–99 years) diagnosed with pancreatic cancer. * Data with 100% coverage of the national population.

3.2. Neuroendocrine tumours

Age-standardised one-year net survival from neuroendocrine tumours was much higher than that of carcinomas, ranging from 40–80% (Table 5, Fig. 5). During 2010–2014, one-year survival was highest in Switzerland (83.7%, 95% CI: 77.2–90.2%), and lowest in China (29.8%, 24.4–35.2%). Improvements in one-year survival were also greater than those of carcinomas, increasing less than 5% in six countries (Korea and Turkey; and France, Germany, Italy and Portugal), 5–10% Ireland and Taiwan, and more than 10% in 12 countries (Canada and the United States; nine countries in Europe; and Australia). Four countries (China; Belgium, Finland and Poland) showed small decreases in one-year survival over time.

Age-standardised five-year survival from neuroendocrine tumours was also much higher than that of carcinomas, in the range 20–50% (Table 6, Fig. 6). The highest five-year survival for adults diagnosed

during 2010–2014 was in Slovakia (75.0%, 95% CI: 58.4–91.5%) and the lowest survival was in China (18.4%, 13.6–23.2%). There were large improvements in five-year survival from neuroendocrine tumours in most countries: survival increased 10–15% in eight countries (Canada; Taiwan; and six countries in Europe) and more than 15% in six countries (United States; Finland, Netherlands, Slovakia and the United Kingdom; and Australia), while it decreased only in Belgium, China and Denmark. There was wide variation world-wide in age-standardised five-year survival from neuroendocrine tumours (Fig. 4).

3.3. Other specified morphologies

Age-standardised one-year net survival from tumours of other specified morphologies could only be estimated for the United States (Table 5) due to small numbers. In 2010–2014, one-year survival from these tumours (60.7%, 95% CI: 53.9–67.5%) was slightly lower than

Table 4

Number and proportion of tumours with known morphological sub-type, by country and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014): adults (15–99 years) diagnosed with pancreatic cancer.

	Period of diagnosis	Carcinomas		Neuroendocrine		Other specific		Total No.
		No.	%	No.	%	No.	%	
AFRICA								
Algeria (3 registries)	2000–2004	22	100.0	–	–	–	–	22
	2005–2009	99	98.0	1	1.0	1	1.0	101
	2010–2014	85	93.4	5	5.5	1	1.1	91
Mauritius*	2000–2004	–	–	–	–	–	–	–
	2005–2009	–	–	–	–	–	–	–
	2010–2014	45	100.0	–	–	–	–	45
South Africa (Eastern Cape)	2000–2004	21	100.0	–	–	–	–	21
	2005–2009	22	100.0	–	–	–	–	22
	2010–2014	19	100.0	–	–	–	–	19
AMERICA (CENTRAL AND SOUTH)								
Argentina (3 registries)	2000–2004	167	97.1	4	2.3	1	0.6	172
	2005–2009	720	97.4	17	2.3	2	0.3	739
	2010–2014	535	97.4	8	1.5	6	1.1	549
Brazil (6 registries)	2000–2004	2247	98.9	25	1.1	–	–	2272
	2005–2009	1938	97.0	57	2.9	2	0.1	1997
	2010–2014	1358	95.0	69	4.8	2	0.1	1429
Chile (4 registries)	2000–2004	89	100.0	–	–	–	–	89
	2005–2009	401	98.0	8	2.0	–	–	409
	2010–2014	138	97.9	3	2.1	–	–	141
Colombia (3 registries)	2000–2004	335	99.4	1	0.3	1	0.3	337
	2005–2009	428	98.2	7	1.6	1	0.2	436
	2010–2014	437	96.0	17	3.7	1	0.2	455
Costa Rica*	2000–2004	286	98.3	4	1.4	1	0.3	291
	2005–2009	452	96.8	15	3.2	–	–	467
	2010–2014	410	95.3	20	4.7	–	–	430
Ecuador (5 registries)	2000–2004	202	100.0	–	–	–	–	202
	2005–2009	399	97.8	8	2.0	1	0.2	408
	2010–2014	446	97.2	10	2.2	3	0.7	459
Guadeloupe (France)*	2000–2004	–	–	–	–	–	–	–
	2005–2009	48	92.3	3	5.8	1	1.9	52
	2010–2014	106	92.2	9	7.8	–	–	115
Martinique (France)*	2000–2004	89	89.0	10	10.0	1	1.0	100
	2005–2009	106	93.0	8	7.0	–	–	114
	2010–2014	80	92.0	7	8.0	–	–	87
Puerto Rico*	2000–2004	612	98.2	8	1.3	3	0.5	623
	2005–2009	786	95.2	36	4.4	4	0.5	826
	2010–2014	512	95.7	22	4.1	1	0.2	535
Uruguay*	2000–2004	–	–	–	–	–	–	–
	2005–2009	608	98.5	7	1.1	2	0.3	617
	2010–2014	954	99.4	6	0.6	–	–	960
AMERICA (NORTH)								
Canada (10 registries)	2000–2004	15,587	97.0	468	2.9	15	0.1	16,070
	2005–2009	17,812	96.2	678	3.7	19	0.1	18,509
	2010–2014	17,401	93.4	1215	6.5	23	0.1	18,639
United States (49 registries)	2000–2004	127,597	96.4	4593	3.5	199	0.2	132,389
	2005–2009	148,016	95.4	6952	4.5	178	0.1	155,146
	2010–2014	132,989	93.3	9413	6.6	194	0.1	142,596
ASIA								
China (21 registries)	2000–2004	2389	99.4	14	0.6	–	–	2403
	2005–2009	7813	98.2	140	1.8	–	–	7953
	2010–2014	8501	97.1	245	2.8	8	0.1	8754
Cyprus*	2000–2004	32	97.0	1	3.0	–	–	33
	2005–2009	196	95.1	10	4.9	–	–	206
	2010–2014	275	93.2	20	6.8	–	–	295

(continued on next page)

Table 4 (continued)

	Period of diagnosis	Carcinomas		Neuroendocrine		Other specific		Total No.
		No.	%	No.	%	No.	%	
India (Karunagappally)	2000–2004	27	100.0	–	–	–	–	27
	2005–2009	50	100.0	–	–	–	–	50
	2010–2014	56	98.2	1	1.8	–	–	57
Israel*	2000–2004	2494	97.4	60	2.3	6	0.2	2560
	2005–2009	2701	95.9	111	3.9	5	0.2	2817
	2010–2014	2512	92.8	189	7.0	5	0.2	2706
Japan (16 registries)	2000–2004	14,277	98.9	142	1.0	13	0.1	14,432
	2005–2009	31,852	98.9	339	1.1	29	0.1	32,220
	2010–2014	26,668	98.5	404	1.5	15	0.1	27,087
Jordan*	2000–2004	167	97.7	3	1.8	1	0.6	171
	2005–2009	270	96.1	10	3.6	1	0.4	281
	2010–2014	481	96.2	17	3.4	2	0.4	500
Korea*	2000–2004	13,904	99.1	113	0.8	19	0.1	14,036
	2005–2009	19,161	98.7	238	1.2	23	0.1	19,422
	2010–2014	24,920	96.2	935	3.6	44	0.2	25,899
Kuwait*	2000–2004	54	94.7	3	5.3	–	–	57
	2005–2009	91	100.0	–	–	–	–	91
	2010–2014	85	92.4	7	7.6	–	–	92
Malaysia (Penang)	2000–2004	–	–	–	–	–	–	–
	2005–2009	157	96.3	5	3.1	1	0.6	163
	2010–2014	183	98.4	3	1.6	–	–	186
Qatar*	2000–2004	35	97.2	1	2.8	–	–	36
	2005–2009	52	98.1	1	1.9	–	–	53
	2010–2014	89	91.8	8	8.2	–	–	97
Singapore*	2000–2004	675	97.3	18	2.6	1	0.1	694
	2005–2009	760	95.7	33	4.2	1	0.1	794
	2010–2014	1153	92.0	99	7.9	1	0.1	1253
Taiwan*	2000–2004	3346	97.3	77	2.2	15	0.4	3438
	2005–2009	4555	96.1	176	3.7	8	0.2	4739
	2010–2014	6310	92.1	526	7.7	18	0.3	6854
Thailand (6 registries)	2000–2004	728	99.5	2	0.3	2	0.3	732
	2005–2009	1350	99.0	13	1.0	1	0.1	1364
	2010–2014	1155	97.2	32	2.7	1	0.1	1188
Turkey (9 registries)	2000–2004	649	98.6	8	1.2	1	0.2	658
	2005–2009	2944	96.7	95	3.1	6	0.2	3045
	2010–2014	3447	94.6	189	5.2	6	0.2	3642
EUROPE								
Austria*	2000–2004	5257	96.9	164	3.0	4	0.1	5425
	2005–2009	5895	96.4	214	3.5	7	0.1	6116
	2010–2014	6493	95.1	324	4.7	13	0.2	6830
Belgium*	2000–2004	1010	94.8	55	5.2	–	–	1065
	2005–2009	5600	93.8	358	6.0	12	0.2	5970
	2010–2014	7367	92.3	601	7.5	12	0.2	7980
Croatia*	2000–2004	1608	98.8	19	1.2	–	–	1627
	2005–2009	1630	97.1	43	2.6	5	0.3	1678
	2010–2014	1408	93.5	84	5.6	14	0.9	1506
Czech Republic*	2000–2004	3870	97.5	82	2.1	19	0.5	3971
	2005–2009	4533	95.1	221	4.6	12	0.3	4766
	2010–2014	5601	94.3	332	5.6	6	0.1	5939
Denmark*	2000–2004	3806	98.0	74	1.9	5	0.1	3885
	2005–2009	4434	97.7	98	2.2	5	0.1	4537
	2010–2014	4712	97.0	136	2.8	9	0.2	4857
Estonia*	2000–2004	455	98.5	7	1.5	–	–	462
	2005–2009	494	95.9	19	3.7	2	0.4	515
	2010–2014	365	92.9	27	6.9	1	0.3	393
Finland*	2000–2004	2440	97.0	69	2.7	6	0.2	2515

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Table 4 (continued)

	Period of diagnosis	Carcinomas		Neuroendocrine		Other specific		Total No.
		No.	%	No.	%	No.	%	
	2005–2009	2810	94.5	158	5.3	5	0.2	2973
	2010–2014	3010	93.1	222	6.9	2	0.1	3234
France (15 registries)	2000–2004	2985	93.2	213	6.7	5	0.2	3203
	2005–2009	5474	92.9	403	6.8	15	0.3	5892
	2010–2014	1424	93.6	95	6.2	3	0.2	1522
Germany (10 registries)	2000–2004	11,159	96.4	403	3.5	19	0.2	11,581
	2005–2009	18,151	96.0	727	3.8	34	0.2	18,912
	2010–2014	18,063	94.4	1038	5.4	31	0.2	19,132
Iceland*	2000–2004	140	97.2	4	2.8	–	–	144
	2005–2009	146	99.3	1	0.7	–	–	147
	2010–2014	178	93.7	12	6.3	–	–	190
Ireland*	2000–2004	825	95.4	38	4.4	2	0.2	865
	2005–2009	1339	94.6	72	5.1	5	0.4	1416
	2010–2014	1332	92.2	110	7.6	3	0.2	1445
Italy (44 registries)	2000–2004	17,840	98.1	334	1.8	15	0.1	18,189
	2005–2009	26,691	97.3	710	2.6	19	0.1	27,420
	2010–2014	10,656	96.1	424	3.8	9	0.1	11,089
Latvia*	2000–2004	1485	99.5	6	0.4	1	0.1	1492
	2005–2009	1465	98.5	20	1.3	2	0.1	1487
	2010–2014	1727	98.5	26	1.5	1	0.1	1754
Lithuania*	2000–2004	974	95.4	45	4.4	2	0.2	1021
	2005–2009	1228	95.3	56	4.3	4	0.3	1288
	2010–2014	696	93.7	44	5.9	3	0.4	743
Malta*	2000–2004	206	99.5	1	0.5	–	–	207
	2005–2009	212	97.7	5	2.3	–	–	217
	2010–2014	272	95.4	13	4.6	–	–	285
Netherlands*	2000–2004	7424	97.4	191	2.5	11	0.1	7626
	2005–2009	9311	96.2	350	3.6	15	0.2	9676
	2010–2014	10,817	94.8	591	5.2	7	0.1	11,415
Norway*	2000–2004	1813	94.5	101	5.3	5	0.3	1919
	2005–2009	2115	93.9	136	6.0	2	0.1	2253
	2010–2014	2246	89.9	251	10.0	2	0.1	2499
Poland* (16 registries)	2000–2004	5398	98.1	91	1.7	13	0.2	5502
	2005–2009	8071	96.7	262	3.1	15	0.2	8348
	2010–2014	10,108	96.3	364	3.5	24	0.2	10,496
Portugal* (4 registries)	2000–2004	1566	95.0	78	4.7	4	0.2	1648
	2005–2009	2591	94.1	155	5.6	8	0.3	2754
	2010–2014	2062	91.2	196	8.7	3	0.1	2261
Romania (Cluj)	2000–2004	–	–	–	–	–	–	–
	2005–2009	254	94.8	14	5.2	–	–	268
	2010–2014	286	96.9	9	3.1	–	–	295
Russian Federation (5 registries)	2000–2004	763	97.6	16	2.0	3	0.4	782
	2005–2009	1752	98.4	22	1.2	6	0.3	1780
	2010–2014	2617	97.4	66	2.5	5	0.2	2688
Slovakia*	2000–2004	2239	97.9	46	2.0	1	<0.1	2286
	2005–2009	3412	97.8	74	2.1	3	0.1	3489
	2010–2014	826	97.3	21	2.5	2	0.2	849
Slovenia*	2000–2004	596	94.0	37	5.8	1	0.2	634
	2005–2009	789	93.4	54	6.4	2	0.2	845
	2010–2014	652	91.8	58	8.2	–	–	710
Spain (9 registries)	2000–2004	2752	95.1	138	4.8	4	0.1	2894
	2005–2009	3472	96.0	144	4.0	1	<0.1	3617
	2010–2014	2305	92.9	174	7.0	3	0.1	2482
Sweden*	2000–2004	4090	96.4	142	3.3	9	0.2	4241
	2005–2009	4227	97.1	123	2.8	4	0.1	4354
	2010–2014	5487	97.2	155	2.7	3	0.1	5645

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Table 4 (continued)

	Period of diagnosis	Carcinomas		Neuroendocrine		Other specific		Total No.
		No.	%	No.	%	No.	%	
Switzerland (9 registries)	2000–2004	1873	96.1	76	3.9	–	–	1949
	2005–2009	2302	94.9	119	4.9	4	0.2	2425
	2010–2014	2412	93.9	153	6.0	5	0.2	2570
United Kingdom* (4 registries)	2000–2004	32,016	98.2	547	1.7	33	0.1	32,596
	2005–2009	36,153	97.4	911	2.5	42	0.1	37,106
	2010–2014	41,268	95.7	1829	4.2	37	0.1	43,134
OCEANIA								
Australia* (8 registries)	2000–2004	8959	97.3	232	2.5	14	0.2	9205
	2005–2009	10,994	96.3	409	3.6	15	0.1	11,418
	2010–2014	10,861	93.4	755	6.5	12	0.1	11,628
New Zealand*	2000–2004	1453	97.6	35	2.4	1	0.1	1489
	2005–2009	1844	97.7	41	2.2	2	0.1	1887
	2010–2014	2217	95.6	101	4.4	1	<0.1	2319

* Data with 100% coverage of the national population.

that of neuroendocrine tumours but much higher than survival for carcinomas.

As for one-year survival, age-standardised five-year survival from tumours of other specified morphologies could only be estimated for the United States (Table 6). Five-year survival (41.5%, 95% CI: 34.0–49.1%) followed a similar pattern as one-year survival, with survival lower than that of neuroendocrine tumours but much higher than that of carcinomas. Improvements in one- and five-year survival were similar, showing a 15% increase over time.

3.4. Unknown morphology

Age-standardised one-year net survival from tumours with unknown morphology was the lowest of all morphological sub-types, ranging from 10% to 20% (Table 5). One-year survival was highest in Turkey (18.3%, 95% CI: 10.4–26.2%) and lowest in Slovenia (7.8%, 5.4–10.1%). One-year survival from tumours with unknown morphology decreased over time in 9 countries and increases in one-year survival were generally less than 5%.

Age-standardised five-year net survival from tumours with unknown morphology followed a similar pattern as one-year survival (Table 6). Five-year survival was generally similar to or lower than five-year survival for carcinomas, in the range 0–10%. Five-year survival was highest in Turkey (14.1%, 95% CI: 7.0–21.1%) and lowest in the United Kingdom (2.2%, 0.9–3.5%). Unlike one-year survival, five-year survival for tumours of unknown morphology was slightly higher than that of carcinomas in Poland, Taiwan and Turkey. Five-year survival increased in only 5 countries, with an improvement of less than 5% in each country.

4. Discussion

Including high-quality data from 295 population-based cancer registries in 58 countries, this is to our knowledge the largest study examining trends in pancreatic cancer survival by morphological sub-type to date. Net survival estimates were produced using the same protocol for data collection, the same stringent three-phase data quality control procedures, the same robust methods for each registry, and life tables of background mortality that were specific to single year of age, sex, race/ethnicity (where possible), country and the calendar year of death.

The results from these analyses show that survival from carcinomas of the pancreas remains poor in many countries world-wide, despite some improvement during the 15-year period from 2000 to 2014.

Survival from neuroendocrine tumours was much higher and there were larger improvements in survival over time for this sub-type.

The distribution of known morphological sub-types changed over time, with the proportion of carcinomas decreasing and the proportion of neuroendocrine tumours increasing in the majority of countries. This result is in contrast to previous studies that have reported an increase in the incidence of both pancreatic carcinomas and pancreatic neuroendocrine tumours, which would result in the distribution of the morphological sub-types remaining the same over time [5,8,10]. This difference can be explained by the inclusion of all tumours, regardless of morphological verification, in our study. Though morphological verification of pancreatic tumours remains low relative to other solid tumours, the proportion of tumours that are morphologically verified increased by 10% or more in 20 of the 58 countries. Previous studies examining the incidence of carcinomas excluded non-morphologically verified tumours, thus, the increase in the incidence of carcinomas is likely due to the increase over time in the proportion of tumours morphologically verified [5,8,10].

Additionally, the proportion of tumours with unknown morphology decreased in 21 of the 27 countries that registered tumours of this sub-type. When tumours of unknown morphology were present in the distribution, a decrease in the proportion of unknown morphology generally corresponded to an increase in the proportion of both carcinomas and neuroendocrine tumours over time (Supplementary Table 2). This is in line with results from other studies showing increases in incidence for both carcinomas and neuroendocrine tumours – as the proportion of tumours morphologically verified increases over time, the proportion of unknown morphology decreases resulting in increases in both carcinomas and neuroendocrine tumours [5,8,10].

CONCORD-3 showed a high age-standardised five-year net survival for all pancreatic tumours combined in Kuwait (23.6%, 95% CI: 12.0–35.2%) and Malaysia (19.0%, 12.0–26.0%), during 2010–2014 [7]. Kuwait had a higher proportion of neuroendocrine tumours (7.6%) than many other countries, but also showed a relatively high five-year survival from carcinomas (21.0%, 9.7–32.4%). Additionally, the distribution of morphological sub-types does not explain the higher survival for all morphologies combined in Malaysia (1.6% neuroendocrine).

There is little international variation in survival from carcinomas, while the international variation from pancreatic neuroendocrine tumours is wider. Furthermore, there is no clear geographical pattern in survival for the different morphological sub-types. Some countries, such as the United States, Korea, Portugal and Italy have higher survival than other countries in the same continent for each morphological sub-type.

Table 5
Age-standardised one-year net survival (NS, %): adults (15–99 years) diagnosed with pancreatic cancer by morphological sub-type, country and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014).

	Period of diagnosis	Carcinoma			Neuroendocrine			Other specified			Unknown										
		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI									
AFRICA																					
Algeria (3 registries)	2000–2004			–																	
	2005–2009	53.0	§	42.5	–	63.4															
	2010–2014	46.9	§	35.0	–	58.8															
Mauritius*	2000–2004			–																	
	2005–2009			–																	
	2010–2014			–																	
South Africa (Eastern Cape)	2000–2004			–																	
	2005–2009			–																	
	2010–2014			–																	
AMERICA (CENTRAL AND SOUTH)																					
Argentina (3 registries)	2000–2004	20.1	§	14.3	–	25.9						38.5	§	20.3	–	56.8					
	2005–2009	21.9	§	18.9	–	25.0						18.1	§	10.9	–	25.2					
	2010–2014	27.3	§	23.3	–	31.3						24.0	§	13.7	–	34.4					
Brazil (6 registries)	2000–2004	13.7	§	12.2	–	15.2	63.6	§	42.5	–	84.8										
	2005–2009	30.4	§	28.0	–	32.9	72.7	§	59.2	–	86.2										
	2010–2014	30.5	§	27.8	–	33.2	91.6	§	84.0	–	99.2										
Chile (4 registries)	2000–2004	21.1		12.4	–	29.8															
	2005–2009	8.9		4.7	–	13.0															
	2010–2014	13.8		6.7	–	20.9															
Colombia (3 registries)	2000–2004	18.8	§	14.0	–	23.5															
	2005–2009	15.2		11.4	–	19.0															
	2010–2014	18.0	§	13.7	–	22.3	64.1	§	39.4	–	88.7										
Costa Rica*	2000–2004	40.6	§	34.6	–	46.6															
	2005–2009	29.0	§	24.5	–	33.5	77.1	§	55.1	–	99.1										
	2010–2014	30.8	§	26.1	–	35.6	80.2	§	63.1	–	97.2										
Ecuador (5 registries)	2000–2004	21.2	§	16.0	–	26.4															
	2005–2009	18.8	§	15.0	–	22.6															
	2010–2014	18.4	§	14.8	–	22.1	79.2	§	54.4	–	100.0										
Guadeloupe (France)*	2000–2004			–																	
	2005–2009	32.3	§	18.3	–	46.3															
	2010–2014			–																	
Martinique (France)*	2000–2004	22.9		15.0	–	30.7	70.5		43.6	–	97.4			23.2		9.8	–	36.7			
	2005–2009	28.7		21.2	–	36.3								18.0		9.6	–	26.3			
	2010–2014	28.4		18.2	–	38.5								26.3		14.4	–	38.3			
Puerto Rico*	2000–2004	23.4	§	20.0	–	26.9															
	2005–2009	19.0	§	16.3	–	21.7	73.5	§	58.9	–	88.1										
	2010–2014	23.0	§	19.3	–	26.8	77.4	§	59.4	–	95.4										
Uruguay*	2000–2004			–																	
	2005–2009	15.8	§	13.0	–	18.7															
	2010–2014	16.9	§	14.4	–	19.4															
AMERICA (NORTH)																					
Canada (10 registries)	2000–2004	21.9		21.2	–	22.6	63.0		57.7	–	68.3	46.9		22.8	–	71.0	9.4		5.5	–	13.3
	2005–2009	23.4		22.7	–	24.1	67.7		63.6	–	71.7	58.6		36.9	–	80.3	14.2		9.7	–	18.8
	2010–2014	25.8		25.0	–	26.5	76.9		74.1	–	79.7	71.0		51.2	–	90.8	12.1		7.5	–	16.7
United States (49 registries)	2000–2004	23.9		23.6	–	24.1	63.3		61.8	–	64.9	45.0		38.0	–	51.9					
	2005–2009	27.0		26.7	–	27.2	69.3		68.1	–	70.5	55.8		48.2	–	63.4					
	2010–2014	31.6		31.3	–	31.8	77.2		76.2	–	78.2	60.7		53.9	–	67.5					
ASIA																					
China (21 registries)	2000–2004	26.2		24.4	–	28.0	43.0		18.4	–	67.7										
	2005–2009	21.8		20.8	–	22.8	32.6		24.6	–	40.6										
	2010–2014	22.5		21.5	–	23.4	29.8		24.4	–	35.2										

(continued on next page)

Table 5 (continued)

	Period of diagnosis	Carcinoma			Neuroendocrine			Other specified			Unknown		
		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI	
Cyprus*	2000–2004	19.4	§	6.0 – 32.7									
	2005–2009	32.5	§	26.6 – 38.5	70.9	§	43.9 – 97.9						
	2010–2014	34.0	§	28.4 – 39.7	82.3	§	66.4 – 98.2						
India (Karunagappally)	2000–2004	18.9		4.8 – 33.1									
	2005–2009	26.9		14.7 – 39.2									
	2010–2014	30.4		18.4 – 42.4									
Israel*	2000–2004	31.5	§	29.6 – 33.5	84.3	§	74.0 – 94.7						
	2005–2009	33.4	§	31.4 – 35.3	77.2	§	68.7 – 85.7						
	2010–2014	36.6	§	34.5 – 38.7	76.1	§	69.0 – 83.2						
Japan (16 registries)	2000–2004	27.0	§	26.2 – 27.8	68.2	§	59.7 – 76.7	38.8	§	13.9 – 63.7	16.6	§	14.0 – 19.1
	2005–2009	34.3	§	33.7 – 35.0	73.6	§	68.1 – 79.1	56.4	§	37.9 – 75.0	21.9	§	19.4 – 24.4
	2010–2014	36.8	§	36.1 – 37.6	73.9	§	69.1 – 78.7	58.9	§	34.7 – 83.1	23.1	§	20.5 – 25.6
Jordan*	2000–2004	65.8	§	56.8 – 74.8									
	2005–2009	46.3	§	39.4 – 53.2	70.1	§	43.3 – 96.8						
	2010–2014	34.1	§	29.4 – 38.8	74.6	§	53.3 – 95.9						
Korea*	2000–2004	23.0		22.3 – 23.7	70.3		61.9 – 78.6	32.1		12.3 – 51.9			
	2005–2009	28.7		28.0 – 29.3	70.2		64.5 – 75.9	48.4		28.4 – 68.4			
	2010–2014	32.6		32.0 – 33.2	74.4		70.0 – 78.9	53.2		38.2 – 68.2			
Kuwait*	2000–2004	23.6	§	12.2 – 35.0									
	2005–2009	24.3		17.0 – 31.5									
	2010–2014	40.3		29.6 – 51.1									
Malaysia (Penang)	2000–2004												
	2005–2009	28.0		21.3 – 34.7									
	2010–2014	30.9		24.1 – 37.6									
Qatar*	2000–2004	19.1	§	3.7 – 34.4									
	2005–2009	30.6	§	15.7 – 45.6									
	2010–2014	48.2	§	37.8 – 58.6									
Singapore*	2000–2004	18.6		15.7 – 21.6	51.3		28.7 – 73.8				16.5		9.8 – 23.1
	2005–2009	27.6		24.5 – 30.8	73.6		58.5 – 88.7				10.4		7.0 – 13.9
	2010–2014	31.4		28.6 – 34.2	70.7		62.0 – 79.3				9.7		6.4 – 13.0
Taiwan*	2000–2004	24.6		23.1 – 26.0	68.2		57.7 – 78.7	47.9		23.6 – 72.3	20.7		18.7 – 22.7
	2005–2009	26.6		25.3 – 27.9	57.8		49.5 – 66.1				19.3		17.4 – 21.2
	2010–2014	29.4		28.3 – 30.6	65.0		59.8 – 70.2				18.2		16.3 – 20.1
Thailand (6 registries)	2000–2004	15.6	§	13.0 – 18.2									
	2005–2009	22.7		20.4 – 25.1	74.4		49.0 – 99.9						
	2010–2014	16.6		14.5 – 18.8	66.1		49.7 – 82.5						
Turkey (9 registries)	2000–2004	30.8	§	26.3 – 35.3									
	2005–2009	26.9		25.2 – 28.5	59.6		46.9 – 72.3				20.7		12.9 – 28.4
	2010–2014	29.3		27.8 – 30.8	63.8		53.1 – 74.5				18.3		10.4 – 26.2
EUROPE													
Austria*	2000–2004	24.1	§	22.8 – 25.4	55.1	§	47.3 – 62.8						
	2005–2009	30.1		28.8 – 31.4	57.3		50.6 – 63.9						
	2010–2014	34.1	§	32.8 – 35.4	64.6	§	59.3 – 69.8	61.2	§	35.2 – 87.2			
Belgium*	2000–2004	29.4		26.5 – 32.4	85.2		75.0 – 95.3						
	2005–2009	33.3		31.9 – 34.6	82.2		77.4 – 87.0	51.2		24.0 – 78.3			
	2010–2014	35.8		34.5 – 37.1	81.8		78.3 – 85.3	57.0		29.2 – 84.8			
Croatia*	2000–2004	17.2		15.3 – 19.0	69.5		49.0 – 90.0				21.7		19.1 – 24.2
	2005–2009	16.4		14.5 – 18.3	40.1		25.5 – 54.8				21.8		19.2 – 24.4
	2010–2014	21.3	§	18.9 – 23.6	43.7	§	33.4 – 54.1	19.6	§	0.0 – 39.2	18.7	§	16.3 – 21.1
Czech Republic*	2000–2004	15.1		14.0 – 16.3	35.4		27.0 – 43.7	42.6		21.4 – 63.9	10.8		9.5 – 12.2
	2005–2009	19.7		18.5 – 20.9	36.1		30.2 – 42.0				9.9		8.7 – 11.0
	2010–2014	25.5		24.2 – 26.8	56.2		50.5 – 61.9				9.5		8.2 – 10.8
Denmark*	2000–2004	15.1		13.8 – 16.4	47.7		37.5 – 58.0						
	2005–2009	19.7		18.4 – 21.1	53.1		43.7 – 62.5						

(continued on next page)

Table 5 (continued)

	Period of diagnosis	Carcinoma			Neuroendocrine			Other specified			Unknown		
		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI	
Estonia*	2010–2014	27.1	25.7 – 28.6		58.4	49.9 – 66.8							
	2000–2004	16.0	12.7 – 19.4								18.7	14.7 – 22.7	
	2005–2009	22.7	19.2 – 26.1		75.6	56.0 – 95.2					13.8	10.6 – 17.0	
Finland*	2010–2014	30.8	26.1 – 35.6		89.2	75.8 – 100.0					22.0	16.7 – 27.3	
	2000–2004	23.3	21.5 – 25.1		65.8	54.8 – 76.8					13.6	10.9 – 16.3	
	2005–2009	26.8	24.9 – 28.7		65.4	57.3 – 73.5					13.3	10.9 – 15.8	
France (15 registries)	2010–2014	26.9	§ 25.0 – 28.7		67.2	§ 60.9 – 73.5					12.3	§ 10.5 – 14.1	
	2000–2004	31.4	29.6 – 33.1		71.4	64.2 – 78.7					17.6	15.2 – 20.0	
	2005–2009	34.4	33.1 – 35.8		70.9	66.2 – 75.6					20.2	17.8 – 22.6	
Germany (10 registries)	2010–2014	36.2	33.5 – 38.9		73.8	64.4 – 83.3					16.2	11.9 – 20.4	
	2000–2004	30.0	§ 29.1 – 30.9		63.7	§ 58.3 – 69.2	64.8	§ 43.5 – 86.1			20.2	§ 18.1 – 22.2	
	2005–2009	32.8	31.2 – 34.3		63.8	57.4 – 70.3					14.5	12.0 – 17.0	
Iceland*	2010–2014	35.9	34.1 – 37.6		66.1	59.8 – 72.5					16.6	12.9 – 20.4	
	2000–2004	21.0	14.8 – 27.2										
	2005–2009	20.4	14.0 – 26.8										
Ireland*	2010–2014	25.6	19.3 – 31.9		65.2	38.5 – 91.9							
	2000–2004	16.8	14.2 – 19.3		61.7	46.2 – 77.3					15.0	11.2 – 18.7	
	2005–2009	23.5	21.2 – 25.8		65.1	54.0 – 76.1					9.7	6.6 – 12.8	
Italy (44 registries)	2010–2014	27.6	24.9 – 30.2		72.7	63.5 – 82.0					16.7	11.9 – 21.5	
	2000–2004	25.0	24.2 – 25.7		72.2	66.8 – 77.6	53.7	29.4 – 77.9					
	2005–2009	27.5	26.8 – 28.1		72.1	68.4 – 75.9	63.4	42.1 – 84.7					
Latvia*	2010–2014	29.5	28.5 – 30.5		75.4	70.7 – 80.0							
	2000–2004	14.8	12.9 – 16.7										
	2005–2009	18.1	16.0 – 20.2		65.9	45.3 – 86.6							
Lithuania*	2010–2014	18.8	16.8 – 20.9		67.9	48.8 – 87.1							
	2000–2004	22.9	20.2 – 25.6		63.6	49.4 – 77.9					15.7	13.3 – 18.0	
	2005–2009	23.4	§ 21.0 – 25.8		58.1	§ 45.0 – 71.1					13.6	§ 10.7 – 16.5	
Malta*	2010–2014	28.7	§ 25.2 – 32.1		62.2	§ 50.3 – 74.2					14.3	§ 10.6 – 18.0	
	2000–2004	18.7	13.8 – 23.7										
	2005–2009	15.4	§ 11.0 – 19.9										
Netherlands*	2010–2014	20.6	§ 16.1 – 25.0		76.7	§ 54.5 – 99.0							
	2000–2004	15.1	14.2 – 15.9		51.8	44.6 – 59.0	55.4	26.5 – 84.3					
	2005–2009	17.6	16.8 – 18.5		68.2	62.5 – 73.9	74.5	52.7 – 96.3					
Norway*	2010–2014	21.7	20.8 – 22.6		72.4	68.5 – 76.4							
	2000–2004	18.0	16.2 – 19.8		59.3	48.9 – 69.6					6.7	4.0 – 9.4	
	2005–2009	23.6	21.7 – 25.5		65.5	57.5 – 73.5					15.1	10.3 – 20.0	
Poland* (16 registries)	2010–2014	27.5	25.6 – 29.5		74.5	68.6 – 80.4					6.8	5.3 – 8.3	
	2000–2004	24.8	23.3 – 26.3		64.8	53.0 – 76.7					21.2	20.2 – 22.3	
	2005–2009	25.6	24.6 – 26.7		69.9	61.7 – 78.1	60.9	36.9 – 84.9			21.4	20.4 – 22.4	
Portugal* (4 registries)	2010–2014	27.5	26.5 – 28.5		65.4	58.3 – 72.5	37.7	18.2 – 57.2			17.5	16.4 – 18.6	
	2000–2004	25.0	22.8 – 27.1		72.0	63.0 – 80.9					14.5	11.6 – 17.5	
	2005–2009	29.1	27.3 – 31.0		63.4	54.1 – 72.7					20.6	16.6 – 24.5	
Romania (Cluj)	2010–2014	31.1	27.2 – 34.9		75.3	65.8 – 84.8					13.8	7.8 – 19.7	
	2000–2004												
	2005–2009	19.2	§ 14.5 – 23.8		50.9	§ 25.6 – 76.2							
Russian Federation (5 registries)	2010–2014												
	2000–2004	17.4	14.4 – 20.5		44.2	20.9 – 67.5					18.9	16.8 – 21.0	
	2005–2009	15.7	13.9 – 17.5		59.8	39.6 – 80.1					13.0	11.3 – 14.6	
Slovakia*	2010–2014	14.9	13.5 – 16.4		60.3	48.8 – 71.7					8.1	6.6 – 9.5	
	2000–2004	15.4	§ 13.8 – 16.9		57.2	§ 42.9 – 71.5							
	2005–2009	18.9	17.5 – 20.3		51.3	41.1 – 61.4							
Slovenia*	2010–2014	16.7	14.0 – 19.4		75.9	60.6 – 91.2							
	2000–2004	21.4	17.9 – 24.8		57.4	41.4 – 73.3					7.9	5.2 – 10.6	
	2005–2009	27.8	24.7 – 30.9		67.4	54.7 – 80.0					8.3	6.1 – 10.4	
	2010–2014	28.4	24.8 – 32.0		71.3	61.0 – 81.7					7.8	5.4 – 10.1	

(continued on next page)

Table 5 (continued)

	Period of diagnosis			Carcinoma			Neuroendocrine			Other specified			Unknown		
				NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI		NS (%)	95% CI	
	2000–2004	2005–2009	2010–2014	22.0	20.4	–	58.1	48.9	–	67.4	–	11.2	8.7	–	13.7
Spain (9 registries)	2005–2009	2010–2014	25.2	23.7	–	74.7	66.9	–	82.6	–	9.5	7.4	–	11.7	
	2000–2004	2005–2009	28.9	26.4	–	71.5	61.3	–	81.7	–	8.1	5.8	–	10.3	
	2010–2014	2000–2004	19.9	18.5	–	62.2	53.3	–	71.2	–	–	–	–	–	
Sweden*	2005–2009	2010–2014	25.0	23.6	–	67.7	59.5	–	75.9	–	–	–	–	–	
	2000–2004	2005–2009	32.3	30.9	–	77.7	70.1	–	85.2	–	–	–	–	–	
	2010–2014	2000–2004	25.9	23.6	–	60.0	49.2	–	70.8	–	13.2	9.1	–	17.4	
Switzerland (9 registries)	2005–2009	2010–2014	32.1	30.0	–	72.7	64.6	–	80.8	–	13.7	9.1	–	18.2	
	2000–2004	2005–2009	33.8	31.8	–	83.7	77.2	–	90.2	–	7.5	4.4	–	10.6	
	2010–2014	2000–2004	15.1	14.6	–	59.1	54.6	–	63.6	–	10.1	8.3	–	12.0	
United Kingdom* (4 registries)	2005–2009	2010–2014	19.5	19.0	–	64.8	61.3	–	68.4	–	11.0	8.7	–	13.4	
	2000–2004	2005–2009	22.1	21.6	–	73.3	71.0	–	75.6	–	10.4	7.8	–	13.1	
	2010–2014	2000–2004	24.4	23.4	–	67.2	60.3	–	74.0	–	18.4	13.4	–	23.4	
Australia* (8 registries)	2005–2009	2010–2014	27.5	26.6	–	74.1	69.1	–	79.0	–	18.9	13.6	–	24.1	
	2000–2004	2005–2009	32.5	31.5	–	80.4	77.1	–	83.7	–	10.7	7.2	–	14.1	
	2010–2014	2000–2004	17.6	15.5	–	69.4	54.0	–	84.8	–	–	–	–	–	
New Zealand*	2005–2009	2010–2014	19.3	17.3	–	81.2	69.1	–	93.2	–	–	–	–	–	
	2000–2004	2005–2009	20.8	22.8	–	78.6	70.1	–	87.1	–	–	–	–	–	

§ Survival estimate considered less reliable, because 15% or more of patients were (a) lost to follow-up or censored alive within five years of diagnosis (or if diagnosed in 2010 or later, before 31 December 2014), or (b) registered only from a death certificate or at autopsy, or (c) registered with incomplete dates, i.e., unknown year of birth, unknown month and/or year of diagnosis or unknown year of last vital status. Italics denote survival estimates that are not age-standardised. Survival estimates of 100% that are shown without a confidence interval are those for which the first event (either death or censoring) in that group of patients occurred more than five years after diagnosis.

* Data with 100% coverage of the national population.

However, for the majority of the countries, higher survival for one morphological sub-type does not mean that the country also has higher survival for the others.

Age-standardised one- and five-year net survival from tumours with unknown morphology was the lowest of all the morphological sub-types. As the proportion of unknown morphology generally decreased over time, so did the survival from these tumours. Therefore, it is likely that these tumours are actually aggressive carcinomas that are not biopsied at the time of diagnosis.

Several of the survival estimates were flagged as less reliable, and this was largely due to a high proportion of patients being registered through death certificate only (DCO). Around 7% of all records were registered through DCO, though this proportion varied widely between countries.

Given that all carcinomas were included in the same group, this sub-type is not as homogenous as a group comprising solely of pancreatic ductal adenocarcinomas (ICD-O-3 morphology codes 8020, 8035, 8480, 8490, 8500, 8510, 8560 and 8576) [1]. However, only 8.8% of the patients included in analysis were diagnosed with pancreatic ductal adenocarcinomas. Restricting our analyses only to these tumours would have excluded patients diagnosed with adenocarcinomas (ICD-O-3 morphology code 8140, 45.0% of all patients included in the analyses). We have included some carcinomas that may have better survival than pure adenocarcinomas: serous cystadenocarcinoma (8441), solid pseudopapillary carcinoma (8452), mucinous cystadenocarcinoma (8470), acinar cell carcinoma (8550), acinar cell cystadenocarcinoma (8551) and pancreatoblastoma (8971) [1]. However, the total proportion of carcinomas with these specific morphologies was only 0.6%, thus inclusion of these carcinomas with adenocarcinomas is unlikely to increase survival substantially.

Likewise, within our definition of neuroendocrine tumours, there are some morphologies that have been known to be more aggressive than neuroendocrine tumours in general. Neuroendocrine carcinomas (8246), including large cell (8013) and small cell (8041), have survival similar to other carcinomas [1]. The proportion of neuroendocrine tumours that are neuroendocrine carcinomas was relatively high (63.5%), so the survival estimates for all neuroendocrine tumours may be slightly lower because of the inclusion of neuroendocrine carcinomas.

There are only small variations in the world-wide distribution of pancreatic cancer morphological sub-types, and these variations do not explain fully international differences in five-year survival for all pancreatic tumours combined. However, these analyses highlighted a decreasing trend in the proportion of pancreatic carcinomas that has not been reported previously in the literature.

Stage at diagnosis is an important prognostic factor for pancreatic cancer. The CONCORD-3 database includes data on stage at diagnosis submitted by participating registries that use several different staging classifications. We are finalising a staging algorithm to allow for robust comparisons of stage-specific survival between countries. Future analyses of stage-specific survival for all morphologies combined and by morphology may provide further insight into the international variations in survival.

Survival from pancreatic carcinomas remains poor world-wide and trends for survival from carcinoma showed little improvement over time. Despite slight declines in the proportion of carcinomas over time, carcinomas continue to be the majority of pancreatic tumours. Thus, efforts to develop effective population-based screening techniques, to increase early diagnosis and to decrease resistance to treatment of these tumours, are needed.

Pancreatic neuroendocrine tumours have much higher survival, owing to the fact that the majority of these tumours are functional and are, therefore, symptomatic at earlier stages than carcinomas. Increases in survival from neuroendocrine tumours were also greater than that of carcinomas, indicating that enhancements in diagnostic techniques and treatments have helped improve survival over time. If

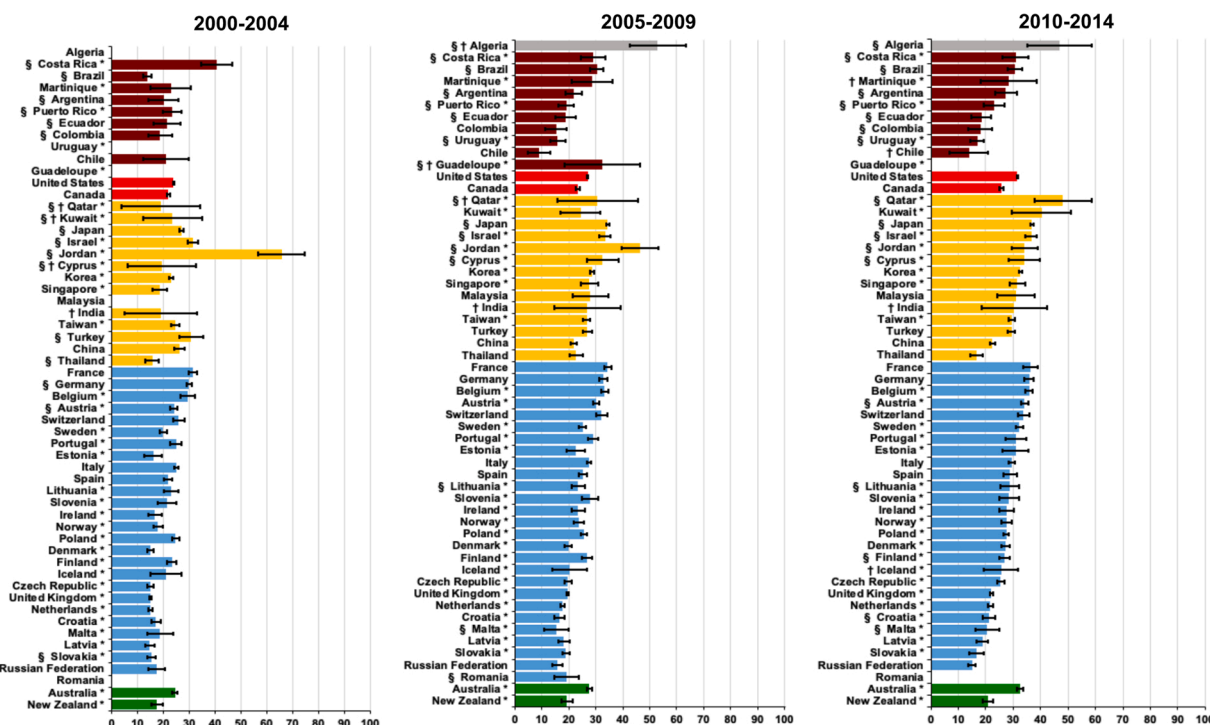


Fig. 2. Distribution of age-standardised one-year net survival (%), adults (15–99 years) diagnosed with pancreatic cancer, by continent, country and period of diagnosis (2000–2004, 2005–2009, 2010–2014): carcinomas. * Data with 100% coverage of the national population. † National estimate not age-standardised. § National estimate flagged as less reliable.

the proportion of neuroendocrine tumours continues to increase, efforts are needed to ensure that patients are diagnosed early and treated adequately.

Ethics approval and consent to participate

The Cancer Survival Group maintains approval for processing sensitive personal data for the CONCORD programme from the UK’s statutory Health Research Authority (reference ECC 3–04(i)/2011; last update 2 October 2021), the National Health Service Research Ethics Service (11/LO/0331; 6 October 2021), and the Ethics Committee of the London School of Hygiene & Tropical Medicine (12171; 6 October 2021).

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The interpretation of the findings in this report, and the opinions, conclusions, and recommendations are those of the authors and do not necessarily reflect the views or official position of the British Columbia Cancer Agency or Cancer Care Ontario (Canada); the Centers for Disease Control and Prevention, the National Cancer Institute, Maryland Cancer Registry, New Hampshire Department of Health and Human Services,

New York City Department of Health and Mental Hygiene, Ohio Department of Health, Pennsylvania Department of Health or West Virginia Cancer Registry (USA); the Health Directorate of the Australian Capital Territory, or the Institut National du Cancer (France).

CRediT authorship contribution statement

Study design: CA and MPC. Acquisition of statutory and ethical approvals: MPC and CA. Data; quality controls: MM, MN, CA, MPC. Formal analyses: MM, MN. Writing original draft: MN, MM, CA, MPC. Review and editing: All authors checked and contributed to writing the final report. All; CONCORD Working Group members had access to the results of all steps of data preparation, quality control and analyses, and contributed to interpretation of the findings. Funding acquisition: CA and MPC.

CONCORD Working Group

Africa—Algeria: S Bouzbid (Registre du Cancer d’Annaba); M Hamdi-Chérif*, L Kara (Registre du Cancer de Sétif); K Meguenni, D Regagba (Registre du Cancer Tlemcen); **Mali:** S Bayo, T Cheick Bougadari (Kankou Moussa University); **Mauritius:** SS Manraj (Mauritius National Cancer Registry); **Morocco:** K Bendahhou (Registre du Cancer du Grand Casablanca); **Nigeria:** A Ladipo, OJ Ogunbiyi* (Ibadan Cancer Registry); **South Africa:** NIM Somdyala (Eastern Cape Province Cancer Registry).

America (Central and South)—Argentina: MA Chaplin, F Moreno (National Childhood Cancer Registry); GH Calabrano, SB Espinola (Chubut Cancer Registry); B Carballo Quintero, R Fita (Registro Provincial de Tumores de Córdoba); WD Laspada (Registro Provincial de Tumores de Mendoza); SG Ibañez (Population Registry of Cancer of the Province Tierra del Fuego); **Brazil:** CA Lima (Registro de Câncer de Base Populacional de Aracaju); A Mafra Da Costa (Registro de Câncer de Base Populacional da Região de Barretos); PCF De Souza (Registro de Câncer de Base Populacional de Cuiabá); J Chaves, CA Laporte (Registro de

Table 6
Age-standardised five-year net survival (NS, %): adults (15–99 years) diagnosed with pancreatic cancer by morphological sub-type, country and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014).

Period of diagnosis	Carcinoma	Neuroendocrine			Other specified			Unknown											
		NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI										
AFRICA																			
Algeria (3 registries)	2000–2004			–			–		76.8	§	52.7	–	100.0						
	2005–2009	38.3	§	27.1	–	49.4		–			–								
	2010–2014	30.9	§	18.9	–	42.9		–											
Mauritius*	2000–2004			–			–												
	2005–2009			–			–												
	2010–2014	24.5		11.4	–	37.6		–											
South Africa (Eastern Cape)	2000–2004			–			–												
	2005–2009			–			–												
	2010–2014	21.8	§	0.0	–	49.5		–											
AMERICA (CENTRAL AND SOUTH)																			
Argentina (3 registries)	2000–2004	7.8	§	4.0	–	11.5		–		16.9	§	3.0	–	30.8					
	2005–2009	6.2	§	4.3	–	8.2		–		19.1	§	9.0	–	29.3					
	2010–2014	8.5	§	5.6	–	11.4		–		22.7	§	9.4	–	35.9					
Brazil (6 registries)	2000–2004	3.4	§	2.5	–	4.2	49.4	§	26.8	–	71.9		–						
	2005–2009	7.8	§	6.1	–	9.5	45.2	§	28.7	–	61.8		–						
	2010–2014	7.3	§	5.6	–	9.1	60.1	§	42.3	–	77.9		–						
Chile (4 registries)	2000–2004	4.2		0.2	–	8.2		–		–	0.1		0.0	–	0.5				
	2005–2009	2.7		0.8	–	4.6		–		–	0.0		0.0	–	0.0				
	2010–2014	4.7		0.0	–	9.3		–		–				–					
Colombia (3 registries)	2000–2004	6.7	§	3.6	–	9.7		–											
	2005–2009	3.1		1.4	–	4.9		–											
	2010–2014	4.5	§	2.2	–	6.8	39.4	§	12.1	–	66.8								
Costa Rica*	2000–2004	38.1	§	31.3	–	44.8		–											
	2005–2009	22.2	§	17.6	–	26.9	73.7	§	48.5	–	98.8								
	2010–2014	21.8	§	16.8	–	26.7	75.9	§	55.8	–	96.1								
Ecuador (5 registries)	2000–2004	8.4	§	4.7	–	12.2		–											
	2005–2009	8.7	§	5.9	–	11.5		–											
	2010–2014	7.7	§	5.1	–	10.4	47.9	§	11.3	–	84.4								
Guadeloupe (France)*	2000–2004			–				–											
	2005–2009	6.4	§	0.0	–	13.8		–											
	2010–2014			–				–											
Martinique (France)*	2000–2004	8.9		3.7	–	14.0	38.1		8.3	–	67.9	–	13.2		0.8	–	25.5		
	2005–2009	9.2		3.8	–	14.6		–		–		–	1.5		0.0	–	4.0		
	2010–2014	9.6		2.5	–	16.8		–		–		–	3.1		0.0	–	7.8		
Puerto Rico*	2000–2004	7.7	§	5.4	–	10.1		–											
	2005–2009	6.8	§	5.0	–	8.7	44.6	§	27.5	–	61.8								
	2010–2014	7.5	§	4.8	–	10.2	52.0	§	24.9	–	79.0								
Uruguay*	2000–2004			–				–											
	2005–2009	2.9	§	1.6	–	4.3		–											
	2010–2014	4.3	§	2.9	–	5.7		–											
AMERICA (NORTH)																			
Canada (10 registries)	2000–2004	7.0		6.5	–	7.5	41.6		35.7	–	47.5	33.8		11.1	–	56.5	1.1	0.0	2.4
	2005–2009	7.4		6.9	–	7.8	45.6		41.2	–	50.1	48.2		26.0	–	70.4	0.5	0.0	1.3
	2010–2014	7.2		6.8	–	7.7	53.4		49.1	–	57.6	61.4	37.5	–	85.3	0.9	0.0	–	2.0
United States (49 registries)	2000–2004	5.5		5.4	–	5.7	37.0		35.3	–	38.6	25.6		19.2	–	31.9			
	2005–2009	6.3		6.2	–	6.5	48.2		46.7	–	49.7	33.6		26.0	–	41.3			
	2010–2014	7.8		7.6	–	8.0	56.8		55.4	–	58.3	41.5		34.0	–	49.1			
ASIA																			
China (21 registries)	2000–2004	14.4		12.8	–	16.0	14.5		0.0	–	30.7								
	2005–2009	9.9		9.1	–	10.6	22.9		14.7	–	31.2								
	2010–2014	9.4		8.6	–	10.2	18.4		13.6	–	23.2								
Cyprus*	2000–2004	10.0	§	0.0	–	20.1				–									

(continued on next page)

Table 6 (continued)

	Period of diagnosis	Carcinoma		Neuroendocrine				Other specified		Unknown												
		NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI													
India (Karunagappally)		2005–2009	7.9	§	4.3	–	11.5	15.2	§	0.0	–	35.3	–	–								
		2010–2014	8.6	§	5.2	–	12.1	34.0	§	7.1	–	60.9	–	–								
		2000–2004	4.2		0.0	–	10.5			–	–		–	–								
		2005–2009	5.3		0.0	–	11.4			–	–		–	–								
Israel*		2010–2014	5.7		0.0	–	11.8			–	–		–	–								
		2000–2004	6.0	§§	4.9	–	7.1	51.1	§§	37.6	–	64.6	–	–								
		2005–2009	7.1	§§	5.9	–	8.3	46.9	§§	36.8	–	56.9	–	–								
Japan (16 registries)		2010–2014	8.9	§§	7.4	–	10.4	50.0	§§	41.6	–	58.3	–	–								
	2000–2004	6.4	§	5.9	–	6.9	51.1	§	40.8	–	61.4	32.5	§	8.1	–	56.9	1.8	§	1.0	–	2.5	
	2005–2009	7.0	§	6.7	–	7.4	50.8	§	43.6	–	58.1	35.2	§	16.8	–	53.7	1.5	§	0.9	–	2.2	
Jordan*		2010–2014	7.6	§	7.2	–	8.1	50.6	§	43.8	–	57.3	45.9	§	21.3	–	70.4	1.1	§	0.6	–	1.6
		2000–2004	65.6	§§	50.9	–	80.3			–	–				–	–						
		2005–2009	32.2	§§	25.2	–	39.2	41.5	§	12.7	–	70.4			–	–						
Korea*		2010–2014	23.0	§§	17.7	–	28.3	67.8	§	42.5	–	93.2			–	–						
		2000–2004	7.3		6.9	–	7.8	46.1		36.4	–	55.8	15.9		0.8	–	31.0					
		2005–2009	7.9		7.5	–	8.3	41.0		34.9	–	47.1	28.8		10.2	–	47.4					
Kuwait*		2010–2014	9.0		8.5	–	9.4	50.8		43.6	–	57.9	25.7		10.9	–	40.5					
		2000–2004	7.8	§	0.9	–	14.7			–	–				–	–						
		2005–2009	7.0		3.0	–	11.0			–	–				–	–						
Malaysia (Penang)		2010–2014	21.0		9.7	–	32.4			–	–				–	–						
		2000–2004				–				–	–				–	–						
		2005–2009	9.3		4.8	–	13.8			–	–				–	–						
Qatar*		2010–2014	17.6		10.6	–	24.6			–	–				–	–						
		2000–2004	9.8	§	0.0	–	21.1			–	–				–	–						
		2005–2009	4.2	§	0.0	–	10.2			–	–				–	–						
Singapore*		2010–2014	16.6	§	7.2	–	25.9			–	–				–	–						
		2000–2004	5.2		3.5	–	7.0	21.0		2.5	–	39.4	–		2.3		0.0	–	5.9			
		2005–2009	6.7		4.9	–	8.5	32.0		15.6	–	48.4	–		2.2		0.4	–	4.0			
Taiwan*		2010–2014	7.8		6.0	–	9.7	33.0		22.7	–	43.3	–		2.2		0.4	–	3.9			
		2000–2004	5.1		4.4	–	5.9	43.9	32.3	–	55.5	16.0	0.0	–	33.6	9.6		8.0	–	11.1		
		2005–2009	5.0		4.3	–	5.7	38.2		29.7	–	46.7	–		7.7		6.3	–	9.1			
Thailand (6 registries)		2010–2014	5.2		4.6	–	5.8	51.3		43.9	–	58.7	0.1		0.0	–	0.2	7.2		5.8	–	8.6
		2000–2004	6.7	§	4.8	–	8.5			–	–				–	–						
		2005–2009	9.3		7.5	–	11.2	29.5		0.5	–	58.5	–		–	–						
Turkey (9 registries)		2010–2014	6.0		4.6	–	7.4	41.0		18.5	–	63.6	–		–	–						
		2000–2004	10.7	§	7.6	–	13.9			–	–				–	–						
		2005–2009	8.5		7.3	–	9.6	30.8		21.3	–	40.2	–		12.5		5.9	–	19.1			
EUROPE		2010–2014	8.8		7.7	–	9.8	33.6		25.1	–	42.1	–		14.1		7.0	–	21.1			
		2000–2004	5.5	§	4.8	–	6.3	33.9	§	26.1	–	41.6	–		–	–						
		2005–2009	7.0		6.2	–	7.8	35.3		28.6	–	42.0	–		–	–						
Belgium*		2010–2014	8.2	§	7.3	–	9.1	42.8	§	36.4	–	49.3	22.3	§	0.0	–	45.4					
		2000–2004	5.1		3.6	–	6.6	64.6		48.5	–	80.7	–		–	–						
		2005–2009	5.8		5.1	–	6.5	67.5		61.0	–	74.0	20.1		0.0	–	43.3					
Croatia*		2010–2014	6.7		5.9	–	7.5	63.2		57.9	–	68.5	30.0		0.0	–	60.8					
		2000–2004	4.9		3.8	–	6.1	34.9		13.2	–	56.7	–		15.0		12.5	–	17.5			
		2005–2009	4.7		3.6	–	5.9	24.5		11.7	–	37.4	–		12.8		10.5	–	15.2			
Czech Republic*		2010–2014	5.1	§	3.9	–	6.4	32.2	§	22.1	–	42.2	10.3	§	0.0	–	25.2	10.3	§	8.3	–	12.4
		2000–2004	3.0		2.4	–	3.6	22.3		15.3	–	29.3	27.1	7.9	–	46.3	3.3		2.4	–	4.3	
		2005–2009	4.8		4.0	–	5.5	23.2		17.8	–	28.6	0.2		0.0	–	0.8	2.6		1.9	–	3.3
Denmark*		2010–2014	5.9		5.1	–	6.8	34.0		27.7	–	40.3	–		2.4		1.6	–	3.1			
		2000–2004	2.9		2.2	–	3.6	27.7		18.3	–	37.1	–		–	–						
		2005–2009	4.8		3.9	–	5.6	26.8		18.5	–	35.0	–		–	–						
		2010–2014	7.2		6.2	–	8.3	25.7		17.8	–	33.7	–		–	–						

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Table 6 (continued)

	Period of diagnosis	Carcinoma	Neuroendocrine			Other specified			Unknown												
			NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI											
Estonia*			2000–2004	2.9	1.3	–	4.4	–	–	–	8.0	5.0	–	11.0							
			2005–2009	4.2	2.4	–	6.0	66.1	41.8	–	90.4	–	3.8	1.9	–	5.6					
			2010–2014	5.4	2.8	–	8.0	74.7	43.3	–	100.0	–	4.5	0.8	–	8.2					
Finland*			2000–2004	3.5	2.7	–	4.3	25.0	16.7	–	33.2	–	0.9	0.0	–	1.7					
			2005–2009	4.6	3.5	–	5.7	50.8	42.2	–	59.4	–	0.2	0.0	–	0.4					
			2010–2014	4.2	§	3.3	–	5.0	53.4	§	45.4	–	61.5	–	0.4	§	0.1	–	0.8		
France (15 registries)	2005–2009	6.4	2000–2004	5.8	4.9	–	6.7	43.9	36.1	–	51.6	–	61.5	–	2.4	§	1.4	–	3.3		
			2005–2009	5.7	–	7.2	45.9	40.1	–	51.6	0.0	–	0.1	–	4.1	–	2.8	–	5.4		
			2010–2014	6.8	–	5.1	–	8.4	52.8	–	43.3	–	62.3	–	3.5	–	1.4	–	5.6		
Germany (10 registries)	2000–2004	6.6	2000–2004	§	6.1	–	7.2	43.1	§	37.0	–	49.2	39.6	§	16.9	–	62.3	§	5.4	–	8.4
			2005–2009	8.3	–	7.3	–	9.3	40.9	–	33.9	–	47.9	–	4.3	–	2.7	–	6.0		
			2010–2014	9.3	–	8.1	–	10.5	41.5	–	34.1	–	48.8	–	5.9	–	3.2	–	8.6		
Iceland*			2000–2004	3.0	0.5	–	5.5	–	–	–	–	–	–	–	–	–	–	–	–		
			2005–2009	0.0	–	0.0	–	0.1	–	–	–	–	–	–	–	–	–	–	–		
			2010–2014	0.0	–	0.0	–	0.0	33.3	–	0.0	–	68.6	–	–	–	–	–	–		
Ireland*			2000–2004	3.5	2.2	–	4.8	36.9	19.5	–	54.3	–	–	–	6.3	–	3.9	–	8.7		
			2005–2009	5.3	4.0	–	6.6	34.6	22.9	–	46.3	–	–	–	5.0	–	2.3	–	7.7		
			2010–2014	5.9	4.4	–	7.4	46.7	35.1	–	58.3	–	–	–	6.0	–	3.2	–	8.8		
Italy (44 registries)			2000–2004	5.4	4.9	–	5.9	50.0	43.7	–	56.3	42.0	–	15.9	–	68.1	–	–	–		
			2005–2009	5.9	–	5.5	–	6.3	49.8	–	45.4	–	54.2	49.4	–	26.9	–	71.9	–	–	
			2010–2014	6.8	–	6.2	–	7.4	55.0	–	49.4	–	60.7	–	–	–	–	–	–		
Latvia*			2000–2004	5.8	4.3	–	7.3	–	–	–	–	–	–	–	–	–	–	–			
			2005–2009	8.4	6.7	–	10.1	66.1	43.0	–	89.2	–	–	–	–	–	–	–			
			2010–2014	9.7	8.0	–	11.5	59.8	36.8	–	82.7	–	–	–	–	–	–	–			
Lithuania*			2000–2004	4.2	2.8	–	5.6	31.5	17.1	–	45.9	–	–	–	7.8	–	5.9	–	9.8		
			2005–2009	3.8	§	2.7	–	5.0	38.2	§	24.6	–	51.8	–	–	5.4	§	3.4	–	7.4	
			2010–2014	6.5	§	4.2	–	8.8	37.3	§	26.2	–	48.3	–	–	5.3	§	2.8	–	7.8	
Malta*			2000–2004	5.9	3.1	–	8.8	–	–	–	–	–	–	–	–	–	–	–			
			2005–2009	1.5	§	0.1	–	2.8	–	–	–	–	–	–	–	–	–	–			
			2010–2014	3.1	§	0.9	–	5.3	77.9	§	55.3	–	100.0	–	–	–	–	–			
Netherlands*			2000–2004	2.1	1.7	–	2.5	30.0	24.2	–	35.8	29.3	–	3.8	–	54.8	–	–			
			2005–2009	3.1	–	2.7	–	3.5	47.1	–	40.9	–	53.2	32.9	–	9.0	–	56.9	–	–	
			2010–2014	4.1	–	3.6	–	4.7	52.3	–	46.8	–	57.7	–	–	–	–	–			
Norway*			2000–2004	2.7	1.9	–	3.4	38.7	27.3	–	50.2	–	–	–	3.1	–	0.6	–	5.6		
			2005–2009	2.9	–	2.1	–	3.6	41.6	–	32.8	–	50.3	–	–	5.8	–	2.3	–	9.4	
			2010–2014	3.9	–	2.9	–	4.9	52.4	–	44.5	–	60.4	–	–	2.1	–	1.1	–	3.2	
Poland* (16 registries)	2005–2009	6.1	2000–2004	5.2	4.4	–	6.0	41.9	29.3	–	54.5	–	–	–	9.9	–	9.0	–	10.7		
			2005–2009	5.4	–	6.8	42.0	33.1	–	50.9	48.4	–	23.4	–	73.3	12.6	–	11.7	–	13.5	
			2010–2014	4.6	–	5.7	42.8	34.6	–	51.0	14.4	–	1.3	–	27.5	9.6	–	8.7	–	10.4	
Portugal* (4 registries)			2000–2004	6.9	5.5	–	8.2	46.9	36.1	–	57.7	–	–	–	3.2	–	1.5	–	4.8		
			2005–2009	8.3	–	7.1	–	9.6	35.3	–	28.0	–	42.5	–	–	7.4	–	4.6	–	10.2	
			2010–2014	9.8	–	6.9	–	12.6	57.4	–	46.5	–	68.3	–	–	6.5	–	1.8	–	11.2	
Romania (Cluj)			2000–2004	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–			
			2005–2009	3.1	§	1.2	–	5.0	30.4	§	7.1	–	53.6	–	–	–	–	–			
			2010–2014	7.0	§	3.8	–	10.2	–	–	–	–	–	–	–	–	–	–			
Russian Federation (5 registries)			2000–2004	6.6	4.2	–	8.9	11.1	–	25.9	–	–	–	7.3	–	5.5	–	9.1			
			2005–2009	5.1	–	3.9	–	6.4	51.3	–	30.0	–	72.6	–	–	4.8	–	3.6	–	6.1	
			2010–2014	4.4	–	3.4	–	5.4	20.9	–	14.6	–	27.2	–	–	2.9	–	1.9	–	3.8	
Slovakia*			2000–2004	4.2	§	3.2	–	5.2	30.2	§	16.2	–	–	–	–	–	–	–			
			2005–2009	4.9	–	4.1	–	5.8	30.8	–	20.7	–	40.9	–	–	–	–	–			
			2010–2014	5.4	–	3.6	–	7.2	75.0	–	58.4	–	91.5	–	–	–	–	–			
Slovenia*			2000–2004	4.1	2.5	–	5.7	36.4	–	20.8	–	–	–	2.8	–	1.0	–	4.5			
			2005–2009	4.5	–	3.0	–	6.0	47.7	–	34.0	–	61.5	–	–	1.5	–	0.5	–	2.4	
			2010–2014	4.4	–	2.7	–	6.2	55.2	–	40.6	–	69.8	–	–	0.7	–	0.0	–	1.5	
Spain			2000–2004	4.4	3.6	–	5.3	33.9	–	24.6	–	–	–	1.8	–	1.0	–	2.7			

(continued on next page)

Table 6 (continued)

	Period of diagnosis		Carcinoma		Neuroendocrine		Other specified		Unknown	
	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI	NS (%)	95% CI
(9 registries)	2005-2009	5.8	5.0	48.5	39.9	57.1	2.6	1.2	4.1	
	2010-2014	6.9	5.4	43.0	31.0	55.0	0.9	0.1	1.7	
Sweden*	2000-2004	2.6	2.1	40.9	30.9	51.0	-	-	-	-
	2005-2009	6.3	5.3	44.2	35.4	53.1	-	-	-	-
	2010-2014	8.3	7.2	51.4	41.3	61.6	-	-	-	-
Switzerland	2000-2004	3.7	2.6	40.2	28.8	51.6	1.4	0.0	2.9	
(9 registries)	2005-2009	4.5	3.5	43.2	33.8	52.6	1.0	0.0	2.2	
	2010-2014	5.5	4.3	54.3	44.3	64.3	0.6	0.0	1.4	
United Kingdom*	2000-2004	2.6	2.9	32.1	27.8	36.4	23.1	37.6	2.3	3.3
(4 registries)	2005-2009	3.8	4.0	39.1	35.2	43.0	0.0	0.0	0.8	1.2
	2010-2014	4.4	4.7	47.6	44.1	51.2	7.6	19.2	2.2	3.5
OCEANIA										
Australia*	2000-2004	5.9	6.5	39.9	33.3	46.5	7.3	18.2	2.7	5.0
(8 registries)	2005-2009	6.7	7.3	47.5	41.8	53.2	15.1	32.4	4.8	7.9
	2010-2014	8.0	7.3	58.5	52.5	64.4	11.5	26.7	2.7	4.6
New Zealand*	2000-2004	5.5	4.1	50.5	33.6	67.4	-	-	-	-
(9 registries)	2005-2009	6.7	5.3	40.5	25.3	55.7	-	-	-	-
	2010-2014	6.1	4.8	44.8	31.9	57.7	-	-	-	-

§ Survival estimate considered less reliable, because 15% or more of patients were (a) lost to follow-up or censored alive within five years of diagnosis (or if diagnosed in 2010 or later, before 31 December 2014), or (b) registered only from a death certificate or at autopsy, or (c) registered with incomplete dates, i.e., unknown year of birth, unknown month and/or year of diagnosis or unknown year of last vital status. Italics denote survival estimates that are not age-standardised. Survival estimates of 100% that are shown without a confidence interval are those for which the first event (either death or censoring) in that group of patients occurred more than five years after diagnosis.

* Data with 100% coverage of the national population.

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(Pennsylvania Cancer Registry); J Oh (Rhode Island Cancer Registry); TA Janes, SM Schwartz (Seattle Cancer Surveillance System); SC Chiodini, DM Hurley (South Carolina Central Cancer Registry); MA White-side (Tennessee Cancer Registry); S Rai, MA Williams (Texas Cancer Registry); K Herget, C Sweeney (Utah Cancer Registry); AT Johnson (Vermont Cancer Registry); MB Keitheri Cheteri, P Migliore Santiago (Washington State Cancer Registry); SE Blankenship, S Farley (West Virginia Cancer Registry); R Borchers, R Malicki (Wisconsin Department of Health Services); J Espinoza, J Grandpre (Wyoming Cancer Surveillance Program); HK Weir*, R Wilson (Centers for Disease Control and Prevention); BK Edwards*, A Mariotto (National Cancer Institute).

Asia—China: N Wang, L Yang (Beijing Cancer Registry); JS Chen, Y Zhou (Changle City Cancer Registry); YT He, GH Song (Cixian Cancer Registry); XP Gu (Dafeng County Center for Disease Control and Prevention); D Mei, HJ Mu (Dalian Centers for Disease Prevention and Control); HM Ge, TH Wu (Donghai County Center for Disease Prevention and Control); YY Li, DL Zhao (Feicheng County Cancer Registry); F Jin, JH Zhang (Ganyu Center for Disease Prevention and Control); FD Zhu (Guanyun Cancer Registry); Q Junhua, YL Yang (Haimen Cancer Registry); CX Jiang (Haining City Cancer Registry); W Biao, J Wang (Jianhu Cancer Registry); QL Li (Jiashan County Cancer Registry); H Yi, X Zhou (Jintan Cancer Registry); J Dong, W Li (Lianyungang Center for Disease Prevention and Control); FX Fu, SZ Liu (Linzhou Cancer Registry); JG Chen, J Zhu (Qidong County Cancer Registry); YH Li, YQ Lu (Sihui Cancer Registry); M Fan, SQ Huang (Taixing Cancer Registry); GP Guo, H Zhaolai (Cancer Institute of Yangzhong City); K Wei (Zhongshan City Cancer Registry); WQ Chen*, W Wei*, H Zeng (The National Cancer Center); **Cyprus:** AV Demetriou (Cyprus Cancer Registry); **Hong Kong:** WK Mang, KC Ngan (Hong Kong Cancer Registry); **India:** AC Katakai, M Krishnatreya (Guwahati Cancer Registry); PA Jayalekshmi, P Sebastian (Karunagappally Cancer Registry); PS George, A Mathew (Trivandrum Cancer Registry); A Nandakumar* (National Centre for Disease Informatics and Research); **Iran:** R Malekzadeh, G Roshandel (Golestan Population-based Cancer Registry); **Israel:** L Keinan-Boker, BG Silverman (Israel National Cancer Registry); **Japan:** H Ito, Y Koyanagi (Aichi

Cancer Registry); M Sato, F Tabori (Akita Prefectural Cancer Registry); I Nakata, N Teramoto (Ehime Prefectural Cancer Registry); M Hattori, Y Kaizaki (Fukui Cancer Registry); F Moki (Gunma Prefectural Cancer Registry); H Sugiyama, M Utada (Hiroshima Prefecture Cancer Registry); M Nishimura, K Yoshida (Hyogo Prefectural Cancer Registry); K Kurosawa, Y Nemoto (Ibaraki Prefectural Cancer Registry); H Narimatsu, M Sakaguchi (Kanagawa Cancer Registry); S Kanemura (Miyagi Prefectural Cancer Registry); M Naito, R Narisawa (Niigata Prefecture Cancer Registry); I Miyashiro, K Nakata (Osaka Cancer Registry); D Mori, M Yoshitake (Saga Prefectural Cancer Registry); I Oki (Tochigi Prefectural Cancer Registry); N Fukushima, A Shibata (Yamagata Prefectural Cancer Registry); K Iwasa, C Ono (Yamanashi Cancer Registry); T Matsuda* (National Cancer Center); **Jordan:** O Nimri (Jordan National Cancer Registry); **Korea:** KW Jung, YJ Won (Korea Central Cancer Registry); **Kuwait:** E Alawadhi, A Elbasmi (Kuwait Cancer Registry); **Malaysia:** A Ab Manan (Malaysia National Cancer Registry); F Adam (Penang Cancer Registry); **Mongolia:** E Nansalma, U Tudev (Cancer Registry of Mongolia); C Ochir (Mongolian National University of Medical Sciences); **Qatar:** AM Al Khater, MM El Mistiri (Qatar Cancer Registry); **Singapore:** GH Lim, YY Teo (Singapore Cancer Registry); **Taiwan:** CJ Chiang, WC Lee (Taiwan Cancer Registry); **Thailand:** R Buasorn, S Sangrajrang (Bangkok Cancer Registry); K Suwanrungruang, P Vatanasapt (Khon Kaen Provincial Cancer Registry); K Daoprasert, D Pongnikorn (Lampang Cancer Registry); Lamphun Cancer Registry); A Leklob, S Sangkitipaboon (Lopburi Cancer Registry); SL Geater, H Sriplung (Songkhla Cancer Registry); **Turkey:** O Ceylan, I Kög (Ankara Cancer Registry); O Dirican (Antalya Cancer Registry); T Köse (Bursa Cancer Registry); T Gurbuz (Edirne Cancer Registry); FE Kardeşin, D Turhan (Erzurum Cancer Registry Center); U Aktaş, Y Halat (Eskişehir Cancer Registry); S Eser, CI Yakut (Izmir Cancer Registry); M Altinisk, Y Cavusoglu (Samsun Cancer Registry); A Türkköylü, N Üç üncü (Trabzon Cancer Registry).

Europe—Austria: M Hackl (Austrian National Cancer Registry); **Belarus:** AA Zborovskaya (Belarus Childhood Cancer Subregistry); OV Aleinikova (Belarusian Research Center for Pediatric Oncology,

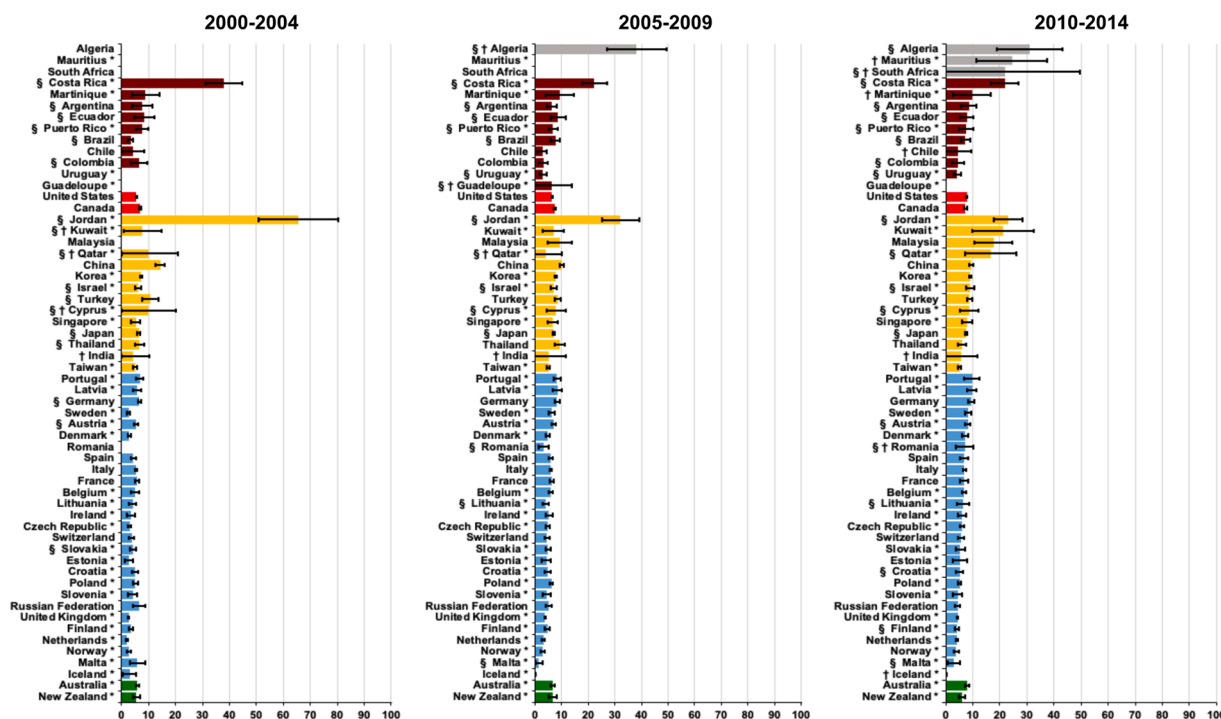


Fig. 3. Distribution of age-standardised five-year net survival (%), adults (15–99 years) diagnosed with pancreatic cancer, by continent, country and period of diagnosis (2000–2004, 2005–2009, 2010–2014): carcinomas. * Data with 100% coverage of the national population. † National estimate not age-standardised. § National estimate flagged as less reliable.

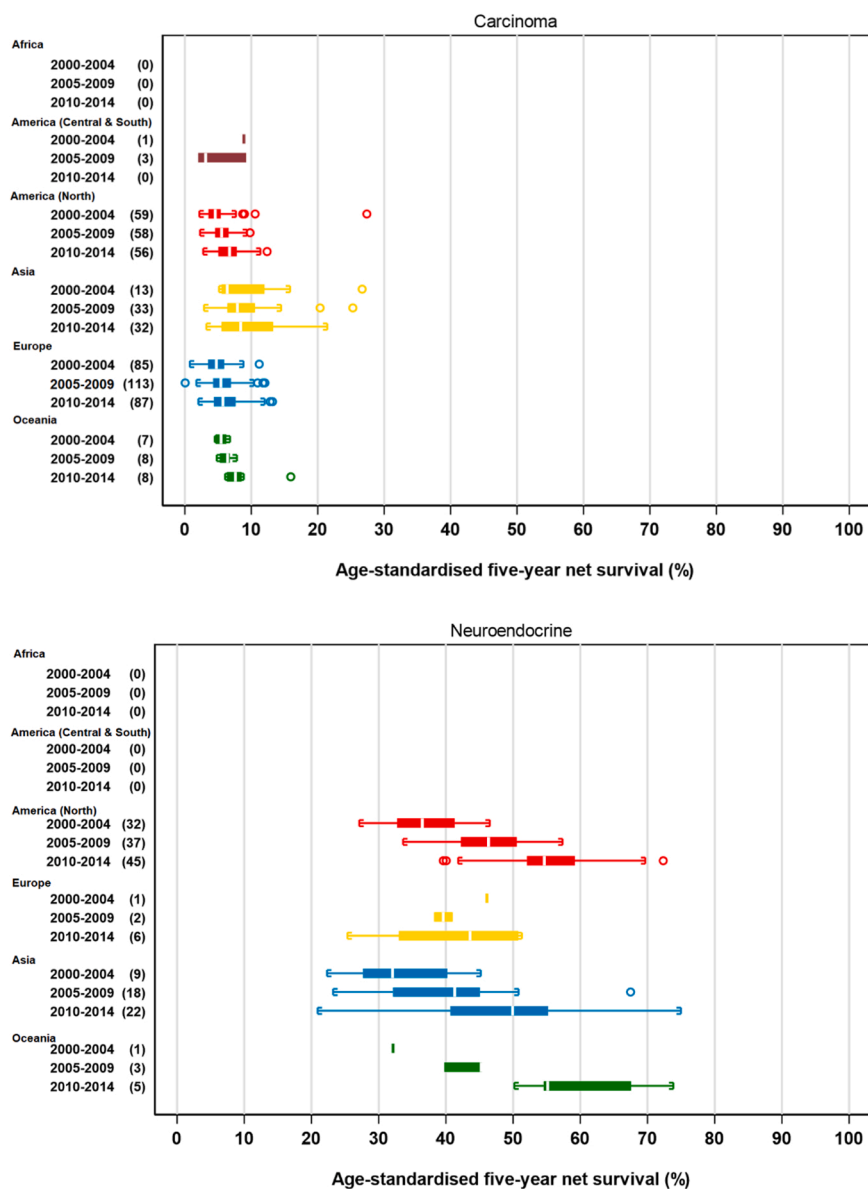


Fig. 4. Global range of age-standardised five-year net survival (%) estimates for carcinomas and neuroendocrine tumours of the pancreas, by continent and calendar period of diagnosis (2000–2004, 2005–2009, 2010–2014): adults (15–99 years). Each box-plot shows the range of survival estimates among all cancer registries for which suitable estimates could be obtained for patients diagnosed in each calendar period, in each continent. The number of registries included in each box-plot is shown in parentheses. Survival estimates considered less reliable are not included (see text). The vertical line inside each box represents the median survival estimate among all contributing registries (the central value in the range, or 50th centile). The box covers the inter-quartile range (IQR) between the lower and upper quartiles (25th and 75th centiles). Where there are only a few widely scattered estimates, the median may be close to the lower or upper quartile. The extreme limits of the box-plot are 1.5*IQR below the lower quartile and 1.5*IQR above the upper quartile. Open circles indicate 'outlier' values, outside the range.

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Monnereau, S Orazio (Registre des Hémopathies Malignes de la Gironde); M Audoin, TC D'Almeida (Registre Général des Cancers de Haute-Vienne); S Boyer, K Hammas (Haut-Rhin Cancer Registry); B Trétarre (Registre des Tumeurs de l'Hérault); M Colonna, P Delafosse (Registre du Cancer du Département de l'Isère); S Plouvier (Registre Général des Cancers de Lille et de sa Région); A Cowpli-Bony (Loire-Atlantique-Vendée Cancer Registry); F Molinié (Loire-Atlantique-Vendée Cancer Registry); French Network of Cancer Registries (FRANCIM); S Bara (Manche Cancer Registry); O Ganry, B Lapôtre-Ledoux (Registre du Cancer de la Somme); L Daubisse-Marliac (Tarn Cancer Registry); N Bossard, Z Uhry (Hospices Civils de Lyon); J Estève (Université Claude Bernard, Lyon); **Germany:** R Stabenow, H Wilsdorf-Köhler (Common Cancer Registry of the Federal States); A Eberle, S Luttmann (Bremen Cancer Registry); I Löhden, AL Nennecke (Hamburg Cancer Registry); J Kieschke, E Sirri (Epidemiological Cancer Registry of Lower Saxony); C Justenhoven, SR Zeissig (Rhineland Palatinate Cancer Registry); B Holleczeck (Saarland Cancer Registry); N Eisemann, A Katalinic (Schleswig-Holstein Cancer Registry); **Gibraltar:** RA Asquez, V Kumar (Gibraltar Cancer Registry); **Greece:** E Petridou (Nationwide Registry for Childhood Haematological Malignancies and Solid Tumors); **Iceland:** EJ Ólafsdóttir, L Tryggvadóttir (Icelandic Cancer Registry, Icelandic Cancer

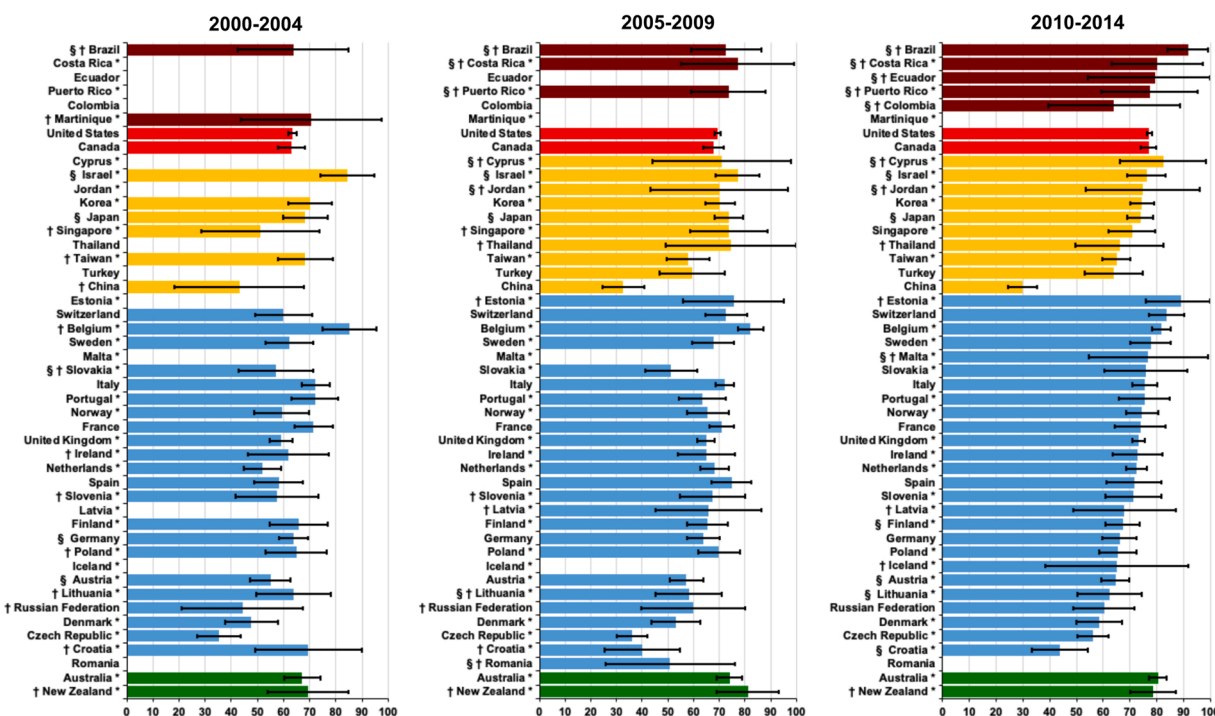


Fig. 5. Distribution of age-standardised one-year net survival (%), adults (15–99 years) diagnosed with pancreatic cancer, by continent, country and period of diagnosis (2000–2004, 2005–2009, 2010–2014): neuroendocrine tumours. * Data with 100% coverage of the national population. † National estimate not age-standardised. § National estimate flagged as less reliable.

Society); **Ireland**: DE Murray, PM Walsh (National Cancer Registry Ireland); H Sundseth* (European Institute of Women’s Health); **Italy**: G Mazzoleni, F Vittadello (Registro Tumori Alto Adige); E Coviello, F Cuccaro (Registro Tumori Puglia – Sezione ASL BT); R Galasso (Registro Tumori di Basilicata); G Sampietro (Registro Tumori di Bergamo); A Giacomini† (Piedmont Cancer Registry Provinces of Biella and Vercelli); M Magoni (Registro Tumori Dell’ASL Di Brescia); A Ardigzone (Registro Tumori Brindisi); A D’Argenzio (Caserta Cancer Registry); AA Di Prima, A Ippolito (Integrated Cancer Registry of Catania-Messina-Siracusa-Enna); AM Lavecchia, A Sutura Sardo (Registro Tumori Catanzaro); G Gola (Registro Tumori della Provincia di Como); P Ballotari, E Giacomazzi (Registro Tumori Cremona; Registro Tumori Mantova); S Ferretti (Registro Tumori della Provincia di Ferrara); L Dal Maso, D Serraino (Registro Tumori del Friuli Venezia Giulia); MV Celesia, RA Filiberti (Registro Tumori Regione Liguria); F Pannozzo (Registro Tumori della Provincia di Latina); A Melcarne, F Quarta (Registro Tumori Della Provincia Di Lecce Sezione RTP); A Andreano, AG Russo (Registro Tumori Milano); G Carrozzi, C Cirilli (Registro Tumori della Provincia di Modena); L Cavalieri d’Oro, M Rognoni (Registro Tumori di Monza e Brianza); M Fusco, MF Vitale (Registro Tumori della ASL Napoli 3 Sud); M Usala (Nuoro Cancer Registry); R Cusimano, W Mazzucco (Registro Tumori di Palermo e Provincia); M Michiara, P Sgargi (Registro Tumori della Provincia di Parma); L Boschetti (Cancer Registry of the province of Pavia); G Chiaranda, P Seghini (Registro Tumori Piacenza); MM Maule, F Merletti (Piedmont Childhood Cancer Registry); E Spata, R Tumino (Registro Tumori della Provincia di Ragusa); P Mancuso (Registro Tumori Reggio Emilia); T Cassetti, R Sassatelli (Pancreas Tumor Registry of Reggio Emilia Province); F Falcini, S Giorgetti (Registro Tumori della Romagna); AL Caiazzo, R Cavallo (Registro Tumori Salerno); D Piras (Registro Tumori Nord Sardegna); F Bella, A Madeddu (Registro Tumori Siracusa); AC Fanetti, S Maspero (Registro Tumori della Provincia di Sondrio); S Carone, A Mincuzzi (Registro Tumori Taranto); G Candela, T Scuderi (Registro Tumori Trapani); MA Gentilini, R Rizzello (Registro Tumori Trento); S Rosso (Piedmont Cancer Registry); A Caldarella, T Intriari (Registro Tumori della Regione Toscana); F

Bianconi (Registro Tumori Umbro di Popolazione); P Contiero, G Tagliabue (Registro Tumori Lombardia, Provincia di Varese); M Rugge, M Zorzi (Registro Tumori Veneto); S Beggiato, A Brustolin (Registro Tumori Della Provincia Di Viterbo); G Gatta (Fondazione IRCCS Istituto Nazionale dei Tumori); R De Angelis (National Centre for Epidemiology); M Vicentini (Italian Association of Cancer Registries (AIRTUM); Registro Tumori Reggio Emilia); R Zanetti* (International Association of Cancer Registries; Piedmont Cancer Registry); F Stracci (Italian Association of Cancer Registries (AIRTUM); Registro Tumori Umbro di Popolazione); **Latvia**: A Maurina, M Onišćuka (Latvian Cancer Registry); **Liechtenstein**: M Mousavi (Liechtenstein); **Lithuania**: N Lipunova, I Vincerževskienė (Lithuanian Cancer Registry); **Malta**: D Agius, N Calleja (Malta National Cancer Registry); **Netherlands**: S Siesling, O Visser (Netherlands Cancer Registry, IKNL); **Norway**: TB Johannesen, S Larønningen (The Cancer Registry of Norway); **Poland**: M Trojanowski (Wielkopolski Rejestr Nowotworów); P Macek (Świętokrzyski Rejestr Nowotworów); T Mierzwa (Kujawsko-Pomorski Rejestr Nowotworów); J Rachtan (Małopolski Rejestr Nowotworów); A Rosińska (Łódzki Rejestr Nowotworów); K Kępska (Dolnośląski Rejestr Nowotworów); B Kościńska (Lubelski Rejestr Nowotworów); K Barna (Lubuski Rejestr Nowotworów); U Sulkowska (Mazowiecki Rejestr Nowotworów); T Gebauer (Opolski Rejestr Nowotworów); JB Łapińska (Podlaski Rejestr Nowotworów); J Wójcik-Tomaszewska (Pomorski Rejestr Nowotworów); M Motnyk (Śląski Rejestr Nowotworów); A Patro (Podkarpacki Rejestr Nowotworów); A Gos (Warmińsko-Mazurski Rejestr Nowotworów); K Sikorska (Zachodniopomorski Rejestr Nowotworów); M Bielska-Lasota (National Institute of Public Health, NIH); JA Didkowska, U Wojciechowska (Polish National Cancer Registry); **Portugal**: G Forjaz de Lacerda, RA Rego (Registro Oncológico Regional dos Açores); B Carrito, A Pais (Registro Oncológico Regional do Centro); MJ Bento, J Rodrigues (Registro Oncológico Regional do Norte); A Lourenço, A Mayer-da-Silva (Registro Oncológico Regional do Sul); **Romania**: LM Blaga, D Coza (Cancer Institute I. Chiricuta); **Russia**: MY Valkov (Arkhangel’sk Regional Cancer Registry); L Gusenkova, O Lazarevich (Population Cancer Registry of the Republic of Karelia); O Prudnikova,

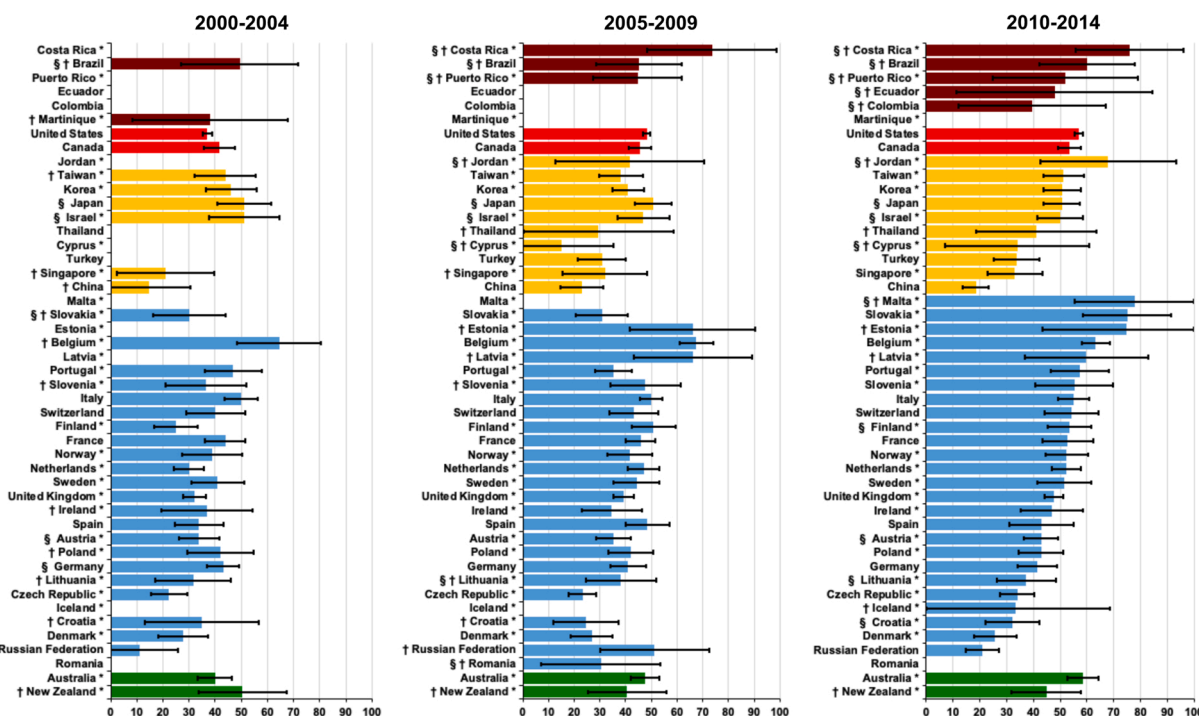


Fig. 6. Distribution of age-standardised five-year net survival (%), adults (15–99 years) diagnosed with pancreatic cancer, by continent, country and period of diagnosis (2000–2004, 2005–2009, 2010–2014): neuroendocrine tumours. * Data with 100% coverage of the national population. † National estimate not age-standardised. § National estimate flagged as less reliable.

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Oceania—Australia: E Chalker, M Smith (Australian Capital

Territory Cancer Registry); J Gugusheff, H You (NSW Cancer Registry); S Qin Li, S Dugdale (Northern Territory of Australia Cancer Registry); J Moore, S Philpot (Queensland Cancer Registry); R Pfeiffer, H Thomas (South Australian Cancer Registry); B Silva Ragaini, AJ Venn (Tasmanian Cancer Registry); SM Evans, L Te Marvelde (Victorian Cancer Registry); V Savietto, R Trevithick (Western Australian Cancer Registry); D Currow* (Cancer Institute NSW); **New Zealand:** C Fowler, C Lewis (New Zealand Cancer Registry).

Declaration of Competing Interest

The authors declare no conflicts of interest.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.canep.2022.102196](https://doi.org/10.1016/j.canep.2022.102196).

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