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Rectal Cancer Epidemiology

Miguel Henriques Abreu[1], Eduarda Matos[2], Fernando Castro Poças[3], Rosa Rocha[4] and Jorge Pinto[4]
[1]*Portuguese Institute of Oncology of Porto, Department of Medical Oncology*
[2]*ICBAS, University of Porto, Department of Health Community*
[3]*Porto's Hospital Centre, Santo Antonio's Hospital, Department of Gastroenterology*
[4]*Oncological Registry of Vila Nova de Gaia*
Portugal

1. Introduction

Colorectal cancer is the fourth most common cancer in men and the third most common one in women worldwide (Parkin, 2004; Parkin et al., 2005), accounting for approximately 436,000 incident cases and 212,000 deaths in 2008 (Quirke et al., 2011). This cancer has an important economic impact, estimating that in the initial, continuing and last year of life phases of care a total of more than $7 billion were spent (Yabroff et al., 2008). Randomized trials have shown that systematic screening of a target population of suitable age can reduce colorectal cancer by detecting asymptomatic lesions (Center et al., 2009).

Although there are differences in the etiologies and epidemiology of colon and rectal cancer (Giovannucci & Wu, 2006), the majority of the studies chose to examine colon and rectum cancers combined. However, a better understanding of these diseases nowadays, shows that these differences have an important impact in their approaches. First of all, the location of the tumours may determines different locations of metastisation. Unlike colon cancers, distal rectal tumours may first metastasize to the lungs because the inferior rectal veins drain into the inferior vena cava rather than into the portal venous system. The histological type can also vary. The vast majority of colorectal tumours are adenocarcinomas but 11-17% are mucinous carcinomas. This type, which has a penchant for the rectum and sigmoid colon, tends to be present at a more advanced stage (Consorti et al., 2000). The carcinoid tumours have a different clinical presentation too, depending on whether they appear in the rectum or in the colon (Marshall & Badnarchuk 1993; Spread et al., 1994). The rectum carcinoids develop at a young age, most of which are less than 2 cm and tend to be indolent. In contrast, colonic carcinoid tumours can be clinically aggressive and often metastise.

With a more accurate review, we can see that many habits could influence the development of rectal cancers and not colon cancers. Some studies support the view that family history, as well as the level of physical activity, is a stronger contributor to colon cancer relative to rectal cancer (Wei et al., 2004). The Women's Health Initiative (a large cohort study) (Paskett et al., 2007) also found a significant link between active cigarette smoking (not passive exposure to cigarette smoke) and rectal but not colon cancer.

These differences are important in terms of monitoring and have implications in treatment options, as well. Compared to colon cancers, the sensitivity of CT scan for detection of

malignant lymph nodes is higher for rectal cancers. Any perirectal adenopathy is presumed to be malignant since benign adenopathies are not typically seen in this area (Thoemi, 1997).
In a general form, rectal cancer shows predominance in male sex with a global worldwide incidence in this group of 13/100,000 by year. The incidence rates vary markedly worldwide with rates per 100,000 among males in the period of 1998-2002 reported to range from 2, 0 in India (New Delhi) to 31, 6 in Canada (Northwest Territories). In Europe the lowest rates in male were registered in Iceland (7, 6) followed by Italy- Salerno Providence (8, 1) and the highest in Czech Republic (27) followed by Slovak Republic (24, 4), (Curado et al., 2007).
A top ten ranking of age-standardized (world) incidence rates in Europe by sex and country can be seen in Table 1.

MEN			WOMEN		
Rank	**Country**	**Rate**	**Rank**	**Country**	**Rate**
1	Czech Republic	27,0	**1**	Czech Republic	12,1
2	Slovak Republic	24,4	**2**	Croatia	10,9
3	Croatia	20,9	**3**	Slovak Republic	10,5
4	Slovenia	20,5	**4**	Slovenia	10,1
5	Ireland	18,3	**4**	Norway	10,1
6	The Netherlands	17,6	**5**	The Netherlands	10,0
7	Germany	17,4	**6**	Denmark	9,8
8	Belgium	17,2	**7**	Russia	9,7
9	Denmark	16,6	**8**	Germany	9,1
10	Russia	16,6	**9**	Belgium	9,0
			10	Serbia	8,5

Data Source: Curado et al., 2007

Table 1. Top Ten Ranking (descending form) of age- standardized (world) incidence rates by sex and country.

Factors that may have contributed to the worldwide variation in incidence patterns include differences in the prevalence of risk factors and screening practices. Established and suspected modifiable risk factors for rectal cancer, including obesity, physical inactivity, smoking, heavy alcohol consumption, a diet high in red or processed meats and inadequate consumption of fruits and vegetables (Giovanucci, 2002; Schottemfeld & Fraumeni, 2006; Botteri et al., 2008), which are also associated with economic development or westernization (Popkin, 1994). For example, in Czech Republic, nearly 60% of men are cigarette smokers (Shafey et al., 2003) and more than 25% of adults are obese (Berghofer et al., 2008). In Japan, the increased intake of milk, meat, eggs and fat/oil over the past several decades has contributed to the increase in obesity in this country (Kuriki & Tajima, 2006; Matsushita et al., 2008).
In Portugal, particularly in the county of Vila Nova de Gaia (North of country) in the period of 2004- 2006 there were, on average 35 new cases per 100,000 inhabitants which, as showed, constitutes one of the highest rates in the world (Abreu et al., 2010).
In this chapter, the authors propose to examine the evolution of rectal cancer epidemiology based on the data of an active population- based cancer registry (The Cancer Registry of Vila Nova de Gaia). Given the near absence of studies focused only in rectal cancer, our data should also be further explored in other future population- based studies.

2. Patients and methods

2.1 Rectal Cancer Registry

The data were extracted from the Cancer Registry of Vila Nova de Gaia (ROG), founded in 1981 (Parkin et al., 2002). This registry, near the city of Porto, covers an area of 170 km², with a 2001 census population of 288 749 (139 808 men and 148941 women). The Cancer Registry of Vila Nova de Gaia uses active cases from different sources including hospitals, general practitioners, the health authority and the district death registration offices. The registry collects the cause of death in patient's death certificate and uses active follow-up to check the life status of apparently living patients avoiding the errors relating to incomplete ascertainment of death in registered patients with cancer and incomplete ascertainment of incident cases. The location of rectal tumours was classified according to the third edition of International Classification of Diseases for Oncology (Fritz et al., 1990). For the stage of the tumours, we used the 2002 version of the tumour node metastasis (TNM) system, with the stage III divided into three prognostic categories (A, B and C) (Greene et al., 2002). For each patient, rectal cancer treatment (surgery and/or chemotherapy and/or radiotherapy) was individualized according to protocols used at the time of diagnosis.

2.2 Statistical analysis

The study concerned the period 1995-2004 (399 cases) using the 1991 and 2001 census in the calculation of specific rates by age group, considering the following age groups (years) less than 44; 45-54; 55-64; 65-74 and 75 and above and the time periods 1995-1997; 1998-2000 and 2001-2004. Sex and age- standardized incidence rates were calculated using the European population and the ratio of the age- standardized rate between time periods, evaluated by a confidence interval of 95%. For both sexes, the tendency of evaluation were analysed by a Poisson regression model. χ^2 analysis was used to compare categorical variables.

Overall survival was calculated using the Kaplan- Meier method, and the curves were compared through a Log Rank test. The effect of topography and of histological type on survival was obtained, by controlling the stage disease, using a Cox proportional hazards regression model. Statistical significance was set to P value less than 0, 05. The statistical analyses were run in SPSS (version 15, 0; SPSS Inc, Chicago, Illinois, USA).

3. Results

There was a slight predominance of males (56.1%) compared with females which corresponds of a ratio of 1, 3. Patients' average age was 67 years old (standard deviation 12.5), with the youngest aged 22 years and the older aged 94 years. Rates increased with age over the three studied periods mainly in the older women (over age 65 years old) (Figs 1 & 2).

The crude rates calculated per 100 000 in the three periods analysed are: 17, 7; 18, 5; 16, 6 for men, and 9, 9; 12, 2; 15, 1 for women. The age-standardized rates are shown in Table 2. Upon analysing the comparison of standardized rate ratio, we conclude that in men the incidence had increased from the first period (1995-1997) to the second (1998-2000) in a nonsignificant way and decreased significantly during the next period (2001-2004). In women, the incidence rates of rectal cancer increased in the three periods, but in a nonsignificant way. The cumulative risk of developing rectal cancer before the age of 75 years in Vila Nova de Gaia was currently (2001-2005) estimated to be 1, 5 % in men and 1, 1% in women.

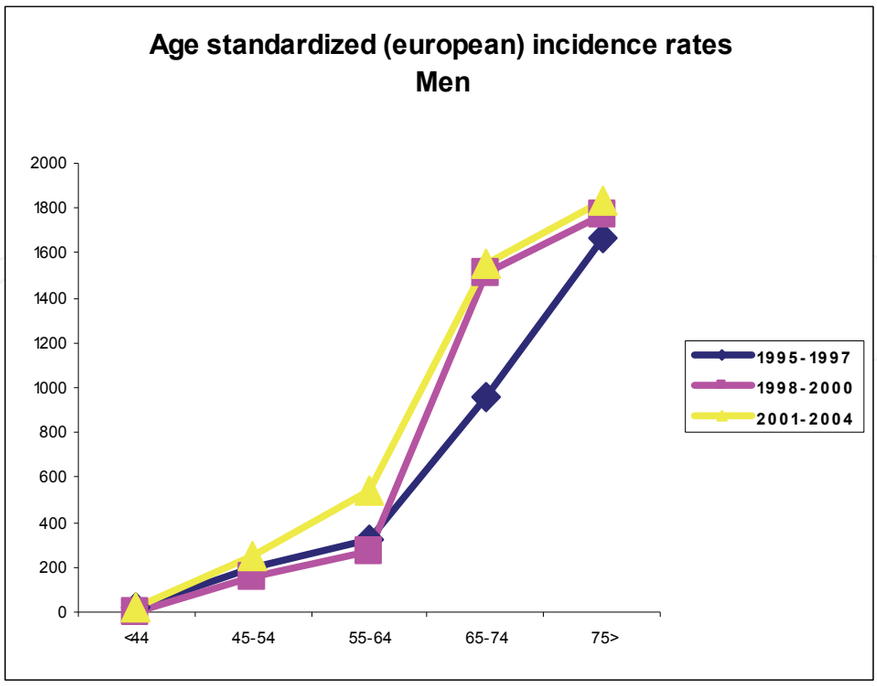


Fig. 1. Age- standardized incidence (European population) rates in men over the three periods

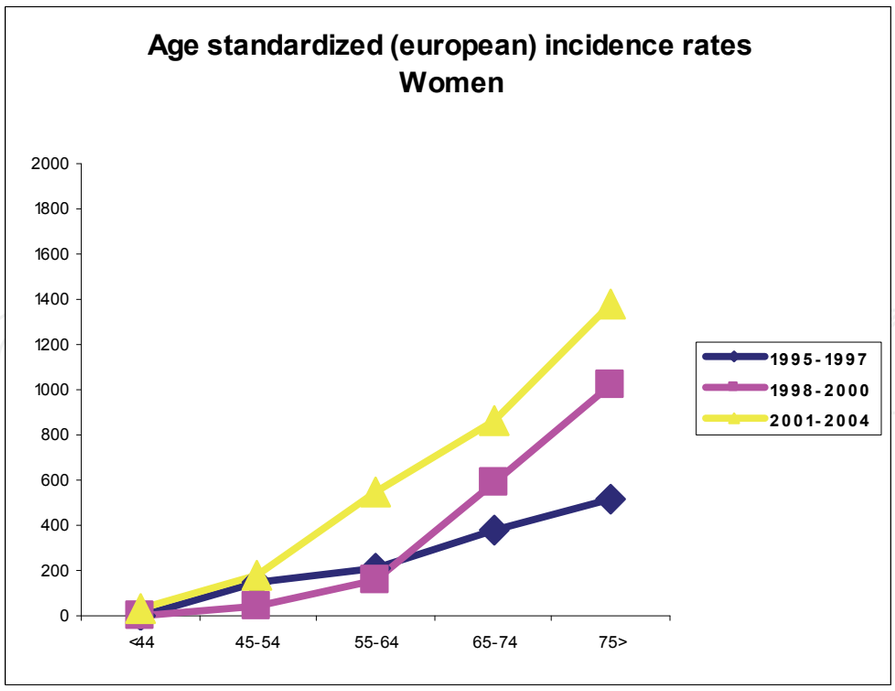


Fig. 2. Age- standardized incidence (European population) rates in women over the three periods

Men				
Period	**ASR**	**SE(ASR)**	**ASR2/ASR1**	**SRR: 95% CI**
1995-1997	23,08	2,444	1,21	0,970-1,506
1998-2000	27,90	2,789		
2001-2004	18,26	1,923	0,67	0,510-0,894
Women				
Period	**ASR**	**SE(ASR)**	**ASR2/ASR1**	**SRR:95% CI**
1995-1997	10,59	1,467	1,14	0,879-1,472
1998-2000	12,04	1,856		
2001-2004	13,59	1,680	1,13	0,950-1,340

ASR, age standardized rate; CI, confidence interval; SE, standardized error; SIR, standardized incidence ratio

Table 2. Standardized incidence rate ratio and 95% CI: comparison between the three time periods (1998-2000 versus 1995-1997 and 2001-2004 versus 1995-1997).

A Poisson regression model was carried out to check whether the presence of variables such as sex, age and period are linked to the risk (Table 3). The incidence of rectal tumours in men was higher, and a significant increase in all age groups (45-54; 55-64; 65-74; >75) was observed compared with the age group less than 44 years (reference group). Rectal tumours showed a nonsignificant increase in 1998-2000 and a nonsignificant decrease during the period 2001-2004. In 80% of cases, disease histology comprised adenocarcinomas, and 71, 9% of these were located in the rectum.

Variable	IRR (95% CI)
Gender	
Female	**Reference category**
Male	**1,77 (1,451-2,161)**
Age, years	
<44	**Reference category**
45-54	**10,44 (6,172-17,673)**
55-64	**21,88 (13,356-35,853)**
65-74	**61,790 (38,679-98,706)**
75+	**86,74 (53,845-139,747)**
Period	
1995-1997	**Reference category**
1998-2000	**1,16 (0,890-1,520)**
2001-2004	**0,98 (0,773-1,256)**

CI, confidence interval; IRR, incidence rate ratio

Table 3. Results of Poisson regression analysis

With regard to the stage, 25,1% of the tumours were diagnosed in stage I , 11,6% in stage II (A:8,3%; B:3,3%), 18,6% in stage III (A:3,0%; B:9,3%; C:6,3%), 13% in stage IV and 31,7% were unstaged. Upon analysing the stage by periods, we noticed that cases were not detected in earlier stages (Table 4).

	Period			
	1995-1997 n (%)	1998-2000 n (%)	2001-2004 n (%)	Total
Stage				
I	24 (24,0)	34 (34,0)	42 (42,0)	100 (100,0)
II	9 (19,6)	8 (17,4)	29 (63,0)	46 (100,0)
III	22 (29,7)	22 (29,7)	30 (40,5)	74 (100,0)
IV	10 (1,9)	18 (34,6)	24 (46,2)	52 (100,0)
Total	65 (23,9)	82 (30,1)	125 (46,0)	272 (100,0)

Table 4. Absolute and relative frequency distribution by stage disease (χ^2 =8, 949; d. f. = 6; *P*=0, 18)

3.1 Survival

Overall survival, which was 68% at the end of the first year and 50% at the end of 5 years, increased over the three periods being analysed (*P*=0,004; Fig.3).

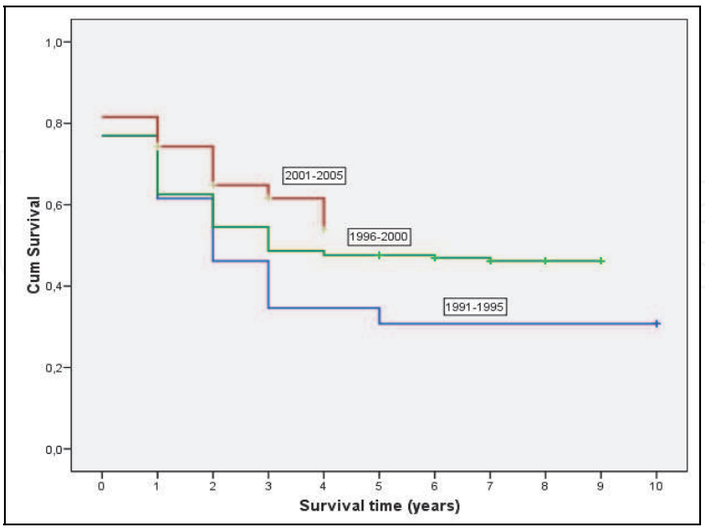


Fig. 3. Overall survival over the three analysed periods

Figure 4 shows that the difference in survival can be clearly seen for stage IV patients (*P*<0,001).

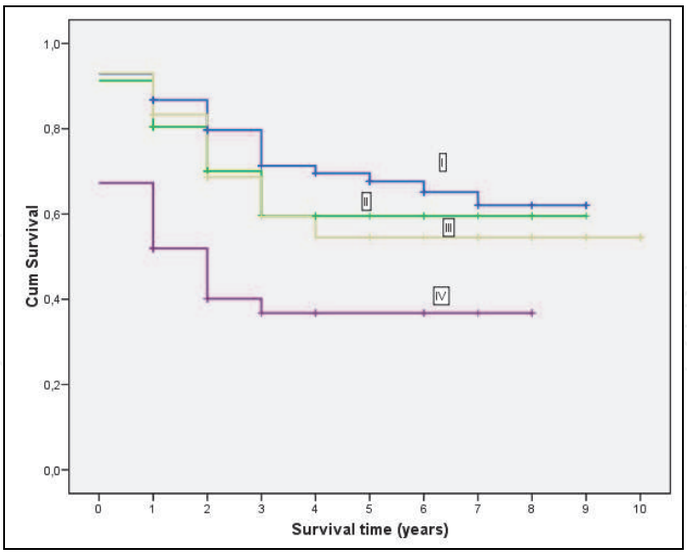


Fig. 4. Overall survival by disease stage

When analysing survival by subtypes in the 70 stage III patients, significant differences were not found (Log Rank test *P*=0.65). The location of the tumour (junction rectum- colon sigmoid versus rectum), after adjustment by stage, is not a significant factor in the prognosis for this cancer (Cox proportional hazards analysis: *P*=0.35). Overall survival is similar in adenocarcinomas versus others controlling the stage (Cox proportional hazards analysis: *P*=0.15).

4. Conclusion

The results of this study can be summarized as follows: first, there was a general increase in the incidence of rectal tumours during the analysed period in both sexes, with a predominance of male; second, tumours were considerably more frequent over the age of 45 years; third, the histological type and the locations analysed have not proven to be prognostic factors; finally, we did not observe an increase in early lesions (stage I/II) and approximately 20% of the individuals had distant metastatic disease at diagnosis. The primary prevention failed.

High- quality population- based cancer incidence data have been collected throughout the World since the early 1960s and published periodically in Cancer Incidence in Five Continents (Jemal et al., 2010). However, even in the last publication, the share of World population covered is only 11% (Curado et al., 2007). With the data available (Ponz de Leon et al., 2000, 2007) and according to our study, rectal cancer is more frequently observed in male patients, mainly in older ones (over 65 years). This reflects the expected increases in life expectancy and aging of the population (Thun et al., 2010). The differences between sexes tend to become smaller over time as it may suggest the slower adoption of certain risk behaviours associated with this cancer (Center et al., 2009). For instance, regular uptake of smoking worldwide traditionally lags several decades in women compared with men, with peak prevalence occurring at a much lower rate (Mackay & Amos, 2003). Additionally, the obesity related metabolic pathways that are implicated in rectal cancer are thought to be more heavily influenced by visceral abdominal fat that men tend to accumulate more of,

compared with women in whom subcutaneous fat is more common (Frezza et al., 2006; Pischon et al., 2008).

In terms of mortality, many authors advocate that the quality of data vary by country, with a high accuracy of underlying cause of death noted in longstanding, economically developed countries and a lower accuracy reported in newly developed or economically transitioning countries (Center et al., 2009). Although the International Classification of the Diseases contains a carefully defined set of rules and guidelines that allow underlying cause to be selected in a uniform manner, interpretation of the concept probably varies considerably (Ferlay et al., 2007). The analysis of any apparent cancer mortality patterns is further complicated by the fact that mortality is influenced to a certain degree both by stage of the disease at diagnosis and by effectiveness of treatment. Hence the death rate for a cancer of equal incidence (i.e. of diagnosed cases) may be different from one country to another (Boyle & Smans, 2008). As in other studies, we noticed that rectal cancer survival varies, in an inversely way (Jessup et al., 1998; Gunderson et al., 2004) with the stage of the cancer (Harling et al., 2004; Rerink et al., 2004). Survival and disease relapse after surgery alone (Quirke et al., 1986; Adam et al., 1994) or combined with adjuvant treatment (Mohiuddin et al., 2000; Grann et al., 2001; Greene et al., 2001; Kapiteijn et al., 2001; Valentini et al., 2001; Tepper et al., 2002; Mohiuddin et al., 2006; Gunderson & Tepper, 2007) for rectal cancer patients are a function of both degree of bowel wall penetration of the primary lesion and nodal status. However nodal involvement alone is inadequate as the sole pathologic factor to predict survival and relapse rates (Quirke et al., 1986; Adam et al., 1994). Invasion through the bowel wall and number of involved lymph nodes are independent high- risk factors for both relapse and survival. For patients with a single high- risk factor of either direct tumor extension beyond the wall, nodes negative (T3N0), or positive nodes but primary tumor confined to the wall (T1-2N1-2), local relapse rates published in older surgical series have ranged from 20% to 40% (Gilbert, 1978; Rich et al., 1983). For patients with both positive nodes and extension beyond the wall (T3-4N1-2), the risk of pelvic relapse was nearly additive (40% to 65% in clinical series and 70% in a reoperative series) (Gilbert, 1978; Rich et al., 1983). The rate of systemic metastases is significantly higher for patients with both high- risk pathologic factors (extensive beyond rectal wall and positive nodes). In the sixth edition of American Joint Committee on Cancer (AJCC) staging (2002) , Stage II was subdivided into IIA (T3N0) and IIB (T4NO), and stage III was subdivided into IIIA (T1-2N1M0), IIIB (T3-4N1M0), and IIIC (any TN2M0)(14). A recently study, which validates the new AJCC staging (7th edition, 2009) for rectal cancer, based in a large cancer databases (Gunderson et al., 2009), demonstrates a more favorable prognosis of patients with T1-2N1-2 lesions (stage IIIC, AJCC sixth edition) in opposite of a less favorable prognosis of patients with T4N1 cancers (stage IIIB, sixth edition). This data supports the shift of T1-2N2 lesions from stage IIIC to an earlier stage of the disease (IIIA/IIIB) and T4N1 lesions from stage IIIB to IIIC and the subdivision of T4, N1 and N2 categories of disease. Patients with T4a lesions (penetrates to the surface of visceral peritoneum (revised definition, AJCC, seventh edition) have a better prognosis than patients with T4b lesions (directly invades or is adherent to other organs or structures) for each N category of disease (N0, N1 and N2). Patients with one positive node (N1a) have a better prognosis than patients with two to three positive nodes (N1b), and patients with four to five positive nodes (N2a) have a better prognosis than patients with seven or more positive nodes (N2b) by T category. In summary, the new AJCC seventh edition staging recommended the following changes: subdivide IIB into IIB (T4aN0) and IIC (T4bN0); shift more favorable

TN2 categories to either IIIA (T1N2a) or IIIB (T2N2a, T1-2N2b, T3N2a); and shift less favorable T4N1 lesions from IIIB to IIIC (T4bN1). For a better comprehension, the following two tables summarize the alterations of the last three AJCC staging based on TNM classifications (Table 5 &6).

Clinical classification		**5th edition (1997)**	**6th edition (2002)**	**7th edition (2009)**
T- primary tumour				
TX	Primary tumour cannot be assessed	+	+	+
T0	No evidence of primary tumour	+	+	+
Tis	Carcinoma in situ: intraepithelial or invasion of lamina propria	+	+	+
T1	Tumour invades submucosa	+	+	+
T2	Tumour invades muscularis propria	+	+	+
T3	Tumour invades through muscularis propria into subserosa or into non-perinealised pericolic or perirectal tissues	+	+	+
T4	Tumour directly invades into other organs or structures and/or perforates visceral peritoneum	+	+	+
T4a	Perforates visceral peritoneum	-	-	+
T4b	Directly invades other organs or structures	-	-	+
N- regional lymph nodes				
NX	Regional lymph nodes cannot be assessed	+	+	+
N0	No regional lymph node metastasis	+	+	+
N1	Metastasis in 1 to 3 regional lymph nodes	+	+	+
N1a	1 node	-	-	+
N1b	2-3 nodes	-	-	+
N1c	Satellites in subserosa, without regional nodes	-	-	+
N2	Metastasis in 4 or more regional lymph nodes	+	+	+
N2a	4-6 nodes	-	-	+
N2b	7 or more nodes	-	-	+
M- distant metastasis				
MX	Distant metastasis cannot be assessed	+	+	-
M0	No distant metastasis	+	+	+
M1	Distant metastasis	+	+	+
M1a	Metastasis confined to one organ (liver, lung, ovary, non- regional lymph node(s))	-	-	+
M1b	Metastasis in more than one organ on the peritoneum	-	-	+

Source: Quirke et al., 2011

Table 5. Comparative analysis of TNM classification of tumours of the rectum, 5th, 6th and 7th edition.

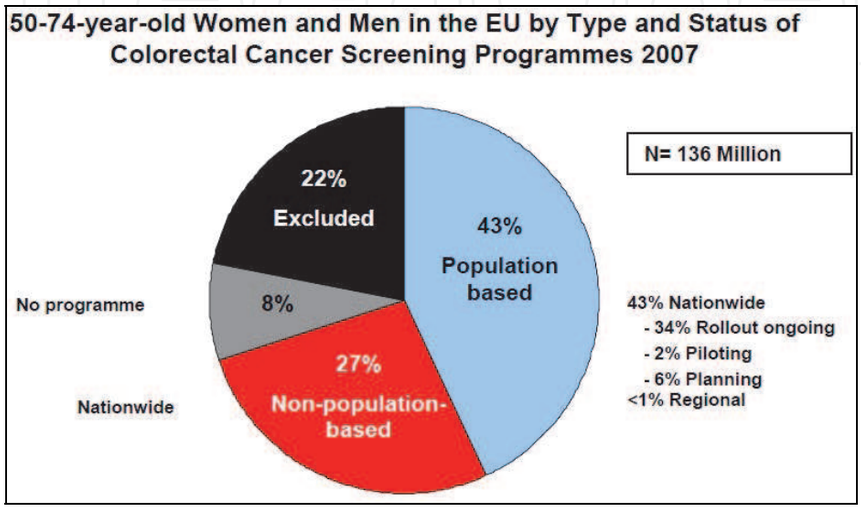
Stage	Stage grouping			5th edition (1997)	6th edition (2002)	7th edition (2009)
	T	N	M			
Stage 0	Tis	N0	M0	+	+	+
Stage I	T1, T2	N0	M0	+	+	+
Stage II	T3, T4	N0	M0	-	-	+
Stage IIA	T3	N0	M0	+	+	+
Stage IIB	T4	N0	M0	+	+	-
Stage IIB	T4a	N0	M0	-	-	+
Stage IIC	T4b	N0	M0	-	-	+
Stage III	Any T	N1, N2	M0	-	-	+
Stage IIIA	T1, T2	N1	M0	+	+	+
Stage IIIA	T1, T2	N1c	M0	-	-	+
Stage IIIA	T1	N2a	M0	-	-	+
Stage IIIB	T3, T4	N1	M0	+	+	-
Stage IIIB	T3, T4a	N1/N1c	M0	-	-	+
Stage IIIB	T2, T3	N2a	M0	-	-	+
Stage IIIB	T1, T2	N2b	M0	-	-	+
Stage IIIC	Any T	N2	M0	+	+	-
Stage IIIC	T4a	N2a	M0	-	-	+
Stage IIIC	T3, T4a	N2b	M0	-	-	+
Stage IIIC	T4b	N1, N2	M0	-	-	+
Stage IV	Any T	Any N	M1	+	+	-
Stage IVA	Any T	Any N	M1a	-	-	+
Stage IVB	Any T	Any N	M1b	-	-	+

T tumour, N node, M metastasis
Source: Quicke et al., 2011

Table 6. Comparative an analysis of TNM stage grouping of rectal cancer in the last three AJCC Staging editions

Unlike other studies (Ponz de Leon et al., 2004, 2007), during the three analyzed periods, we did not observe an increase in early lesions (stage I/II), as there were no statistically significant differences in the stages over time. This denotes that primary prevention failed even the screening for this cancer has been shown to be effective (Boyle, 1995; Faivre et al., 2004) and has been cited as one of the most important factors responsible for the recent decline in colorectal cancer rates in United States (Espey et al., 2007; Levin et al., 2008). On the time of the study, in Portugal, the screening programs were mostly opportunistic which is in agreement with the last International Agency for Research Cancer (IARC) publication that shows that colorectal cancer screening programs are responsible only for less than 15% of the incidence data source worldwide (Curado et al., 2007). Having this dramatic situation in mind, the Guidelines Committee of the World Gastroenterology Organization presented recently (Winawer et al., 2011), a new conceptual model of cascade colorectal cancer screening guidelines that is also evidence based but resource driven. The emphasis in this variation of the model is on colonoscopy resources at the top of the cascade for a screening goal of prevention by finding and removing the colorectal cancer precursor lesions, the adenoma, as well as early detection. The cascade concept says: "do what you can with what you have" rather than, "do it this way or no way". The First Report of Cancer Screening in

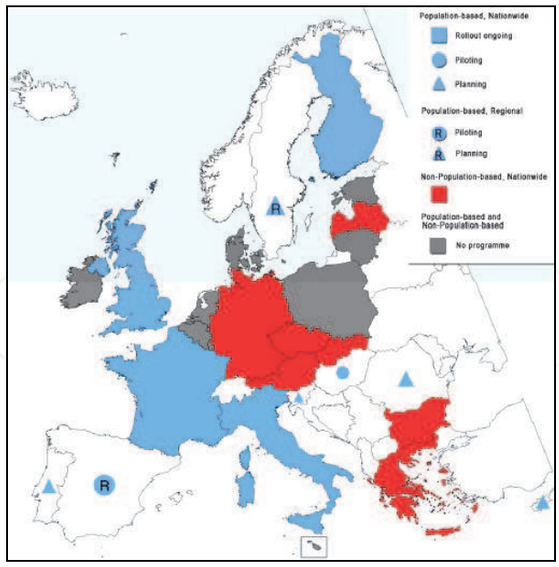
the European Union (Karsa et al., 2008), demonstrates that colorectal cancer programs are currently running or being established in 19 of the 27 Member States. Twelve of the Member States have adopted the population- based approach to program implementation recommended by the Council of the European Union (Cyprus, Finland, France, Hungary, Italy, Poland, Portugal, Romania, Slovenia, Spain, Sweden and the United Kingdom) (Klabunde et al., 2001) and seven have established non- population- based programs (Austria, Bulgaria, The Czech Republic, Germany, Greece, Latvia and the Slovak Republic). With these programs, a total of 70% of population aged 50-74, are covered (Fig. 5).



Source: Karsa et al. 2008

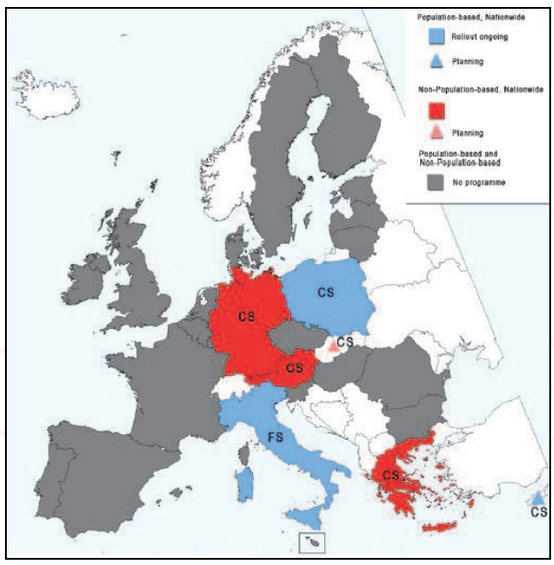
Fig. 5. Proportion of 50-74-year-old women and men targeted for colorectal cancer screening in the European Union in 2007, by program type and country implementation status, and women and men excluded due to age or lack of regional programs in countries with regional implementation status (proportions of 50-74-year-old persons in the EU population in %).

Variations between the Member States in the way colorectal screening is implemented is more pronounced than in other cancer screening like breast cancer. Out of the nineteen Member States running or establishing colorectal cancer screening programs in 2007, twelve (Bulgaria, Czech Republic, Finland, France, Hungary, Latvia, Portugal, Romania, Slovenia, Spain, Sweden, and the United Kingdom) have adopted only the non-invasive test specified in the Council Recommendation (fecal occult blood test- FOBT), six (Austria, Cyprus, Germany, Greece, Italy, Slovak Republic) use both the FOBT and an endoscopic test for primary screening and one (Poland) uses only an endoscopic test (colonoscopy) (Fig. 6&7). With the exception of Italy, in which flexible sigmoidoscopy is the endoscopic screening test used in seven loco- regional programs in 2007, the other Member States with endoscopic programs have adopted colonoscopy as the primary screening test. Out of 17 Member States for which information on the FOBT screening interval is available, 11 have adopted a 2-year interval for all participants with a negative test result. The recommended interval for colonoscopy is 5 years in Greece and 10 years in the four Member States which have adopted endoscopic screening programs. Due to the upper age limits of the respective target populations, the number of screening colonoscopies is limited to once or twice in a lifetime in Germany and Poland.



Source: Karsa et al., 2008

Fig. 6. Colorectal cancer screening programs based on FOBT (fecal occult blood test) in the European Union in 2007, by program type (population-based; non-population-based; no program) and country implementation status (population-based: nationwide or regional, rollout complete or ongoing, piloting and/or planning; non-population-based: nationwide or regional).



FS (flexible sigmoidoscopy), CS (colonscopy).
Source: Karsa et al., 2008

Fig. 7. Colorectal cancer screening programs based on novel screening tests still under evaluation (Endoscopy) in the European Union in 2007, by program type (population-based; non-population-based; no program) and country implementation status (population-based: nationwide or regional, rollout complete or ongoing, piloting and/or planning; non-population-based: nationwide or regional).

Despite the variations among countries, we hope that these measures will change in the medium term, the current patterns of incidence and mortality of rectal cancer.
Actually, this cancer remains a major public health problem worldwide.

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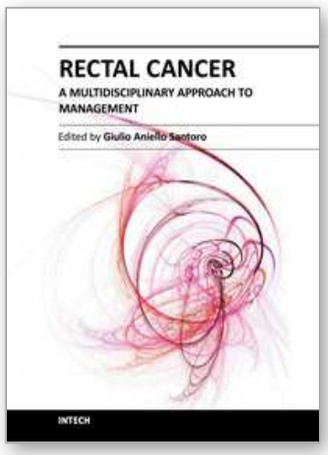

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Dramatic improvements in medicine over the last few years have resulted in more reliable and accessible diagnostics and treatment of rectal cancer. Given the complex physiopathology of this tumor, the approach should not be limited to a single specialty but should involve a number of specialties (surgery, gastroenterology, radiology, biology, oncology, radiotherapy, nuclear medicine, physiotherapy) in an integrated fashion. The subtitle of this book "A Multidisciplinary Approach to Management" encompasses this concept. We have endeavored, with the help of an international group of contributors, to provide an up-to-date and authoritative account of the management of rectal tumor.

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Phone: +385 (51) 770 447
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InTech China
Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
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