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# Clinical features and colorectal cancer survival: An attempt to explain differences between two different Italian regions

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## ABSTRACT

**Aims of the study and methods:** Recent studies suggested the existence of significant regional variations, in Italy, for cancer survival. For most neoplasms, survival rates tended to be lower in Southern regions versus Northern areas; for colorectal tumours, 5-year survival was 60% in Northern regions, but ranged between 40% and 50% in the South. Main purpose of the present study was to find out possible reasons which might explain such differences. To reach this objective, we compared the main epidemiological and clinical data in two areas covered by cancer registration: Modena, in the North, and Naples in the South of Italy. **Results:** The results of the study suggest that differences in colorectal cancer survival can be mainly attributed to a different stage at diagnosis, which was less favourable in a larger fraction of cases diagnosed in Southern Italy. This could be the consequence of an insufficient diffusion of screening procedures. Type of surgery, medical treatment and follow-up seem to play little or no role. The study also shows that incidence rates of colorectal cancer are significantly higher in the North than in the South of the country, and that the excess of cases seen in Modena is limited to the age group 55–75+ years, while age-specific incidence is virtually identical in the younger age classes.

**Conclusion:** This high-resolution study confirms the paramount importance of stage at diagnosis in the management of colorectal cancer, and suggests that social and economic factors are of relevance, even in Western countries, for reducing inequalities in cancer care.

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## 1. Introduction

At variance with other tumours, in the last 2–3 decades the biology of colorectal neoplasms had a real explosion of new knowledge and achievements. Thus, precancerous lesions have been identified, and their removal represents one of the recommended approaches for tumour prevention.<sup>1</sup> Moreover, several risk factors have been detected (not without controversies), and their control might lead to a substantial

reduction of colorectal cancer incidence.<sup>2,3</sup> In an entirely different field – molecular biology – the intimate mechanisms of colorectal tumourigenesis have been partially elucidated, and several cancer-related genes were discovered.<sup>4,5</sup> Finally, in a small but not negligible fraction of all cases, colorectal malignancies are transmitted from one generation to the successive following Mendelian inheritance, and the genes responsible (when mutated) for this pattern of transmission have been identified.<sup>6,7</sup>

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It is not surprising that the new knowledge – together with advancements in chemotherapy, surgical techniques and screening procedures – led to a remarkable improvement of 5-year colorectal cancer survival, that in many developed countries is now in the order of 60%.<sup>8,9</sup> Despite this, unexpected differences in colorectal cancer survival have recently been reported among countries with a rather similar social and economic background.<sup>10,11</sup>

Further observations showed that significant differences in cancer survival could be observed even among regions in the same country. In particular, a recent report of the Italian Association of Cancer Registries (AIRTUM) pointed out the existence of significant regional variations in survival for many common neoplasms.<sup>12</sup> Indeed, survival rates tended to be lower in Southern regions, especially for cancers related to style of life (cigarette smoking, diet and physical activity) and pollution. For colorectal neoplasms, 5-year relative survival was in the order of 60% (for both sexes) in Northern regions, while the corresponding rates in Southern regions ranged between 40% and 50%.

The main objective of the present investigation was to find out possible reasons which might explain differences in colorectal cancer survival between Northern and Southern Italian regions. For this purpose, we compared the main epidemiologic and clinical data in two areas covered by cancer registration from many years: Modena, in the North (region Emilia-Romagna) and Naples, in the South (region Campania). The results showed that several factors, some of which rather unexpected, could be associated with the more favourable outcome observed in continental Italy.

## 2. Materials and methods

### 2.1. Registries and territories

#### 2.1.1. Modena

Details of the general organisation of the Registry have already been given in repeated occasions.<sup>13,14</sup> Briefly, the District includes the town of Modena and 10 smaller communities, for a total of 278,511 residents (137,052 males and 141,459 females) at census 2001. The age-structure of the population is typical of industrialised countries, with small numbers of infants and young individuals, and a progressively increasing elderly population, more marked in the female sex.

Modena is in Northern Italy, nearly at the centre of Padana flat, 180 km South-East of Milan. The area is highly industrialised (textiles, motor cars and pottery, in particular), almost exclusively urban and with one of the highest levels of income per person in Italy.

A systematic registration of all colorectal malignancies started in 1984 and it is ongoing. Data referred to the 21-year period 1984–2004 have recently been reported. In the whole period of activity, main sources of information on affected patients were the archives of the Department of Pathology and the clinical charts available in the Medical and Surgical Divisions of the District. The registration of an incident case usually begins with the morphological diagnosis of cancer and an accurate staging. In a successive phase, clinical charts are obtained and all other relevant information is transferred into

the registration form. Familiarity (one of the main features of the Registry) was frequently evaluated through telephone call and with the help of family doctors.

#### 2.1.2. Naples

The population-based Registry of Region Campania is located in the Health Care District 4, and covers – for 499 km<sup>2</sup> – the North-East part of the province of Naples, in Southern Italy.<sup>15</sup> At census 2001, the resident population was of 540,818 inhabitants (males: 265,186; females: 275,632). The area, which includes 35 small or medium towns, is characterised by a long-lasting economic depression and, consequently, a high unemployment rate. Both rural zones and industrial activities are present in the area covered by the Registry.

Health Care District 4 of Region Campania includes two general hospitals (with Oncology Units), one laboratory of Pathology and a private service of Radiotherapy. However, the majority of patients affected by malignancies of the large bowel are treated in the main hospitals of central Naples or in the numerous private clinics of the province.

Cancer registration started in 1996 and is at present ongoing. The main sources of information are: (1) clinical charts concerning the hospitalisation (discharging forms), (2) other clinical or pathological records or laboratory data and (3) clinical records from other hospitals.

### 2.2. Tumour classification and staging

Colorectal tumours were recorded following the guidelines of the International Classification of Diseases for Oncology (ICD-O, third edition).<sup>16</sup> Ambiguous or unclear definitions – such as ‘carcinoma in situ’, ‘intraepithelial neoplasia’, ‘superficial cancerization’ or ‘neoplastic foci’ – were not considered as cancer unless a clear extension of the neoplasm beyond the muscularis mucosae was evident.<sup>17</sup> Local recurrences of cancer on the suture line of the previous operations for colorectal carcinoma were not considered as new incident cases unless they occurred after 5 years from diagnosis.

Tumours were staged with the TNM system, which closely corresponds to the Dukes’ classification into four main categories.<sup>18</sup> Metachronous tumours were staged independently; in synchronous tumours staging was limited to the most advanced lesion. Neoplasms treated by endoscopy only (i.e., malignant polyps with a normal stalk, resected during colonoscopy) have been considered – rather arbitrarily – as Stage I tumours, though lymph nodes were not assessed.

### 2.3. Incidence and mortality rates and survival

Crude, age-specific, age-standardised (age-adjusted) incidence and mortality rates and cumulative risks were calculated following the indications of the International Agency for Research on Cancer (IARC).<sup>19</sup> The denominators were the resident populations in the period 2000–2005. Age-standardised rates were computed using the standard age-structure of the World, European and Italian populations.<sup>20</sup> For all registered patients – in Modena and in Naples – during the 6-year period 2000–2005, survival was estimated by comparing the registration data with death certificates (for colorectal cancer and other causes) and, when requested, with clinical charts.

The data have been updated to 30 March 2008; it follows that the observation period ranged from a maximum of approximately 8 years to a minimum of 2 years and a half for cases diagnosed in the late 2005.

#### 2.4. Treatment and follow-up

From the surgical descriptions, we could classify the main operations carried out in the registered patients into 'colectomy' (total or, more frequently, subtotal), right and left hemicolectomy, segmental resection, Miles operation (abdominoperineal resection, involving permanent colostomy), endoscopic polypectomy (not followed by surgery) and palliative interventions. Under the heading of 'others' there were Hartmann operation, transanal surgery, resection after polypectomy, and the few cases in whom surgery was not specified.

Medical treatment was considered 'adjuvant' when from the clinical charts and pathological descriptions there was evidence of complete removal of tumours (stages I, II and III); the therapy consisted – in both centres – in the cyclic intravenous administration of 5-fluorouracil (5-FU), over a 6-month period, associated with levamisole or folinic acid. In stage IV patients, platinum-based antimetabolites and, more recently, monoclonal antibodies were also used. Owing to poor documentation, it was not possible to analyse properly the role of radiotherapy (in patients with rectal tumours).

For the purposes of the present study, we assumed that a given patient with a stage I, II, III or IV lesion underwent endoscopic follow-up when there was evidence of at least one full colonoscopic examination during the 3 years successive to the main surgical intervention.

#### 2.5. Statistical analysis

Statistical significance was determined using chi-square test (for categorical data) and Wilcoxon Mann–Whitney test (for continuous variables). All data are expressed as absolute and percentage values.

We examined difference in survival by assessing Relative Survival for each year from 1 to 5 from diagnosis, in all cases and by stage, and by comparing their confidence intervals.<sup>21</sup>

Cox regression model was used to assess the statistical significance of factors associated with the clinical outcome (site of the Registry, pathological stage, gender, age at diagnosis and site of tumors). Statistical analysis was carried out using the STATA/SE 8 software package.

### 3. Results

Table 1 summarises the two groups of patients studied in Modena and in Naples during the 6-year period 2000–2005; incident cases are subdivided by gender, class of age and pathological stage. The most striking difference is the larger fraction of cases (41.7% versus 27.8%) over the age of 75 in the group of Modena ( $P < 0.001$ ). This concept is further emphasised in Fig. 1, which shows age-specific incidence rates in males, female and in the whole group of patients. Rather interestingly, the rates are virtually overlapping up to

**Table 1 – The study groups. Individuals with colorectal malignancies registered during the period 2000–2005 (6 years) in Modena and Naples, by sex, age classes and TNM stage (the number of cases and % of total).**

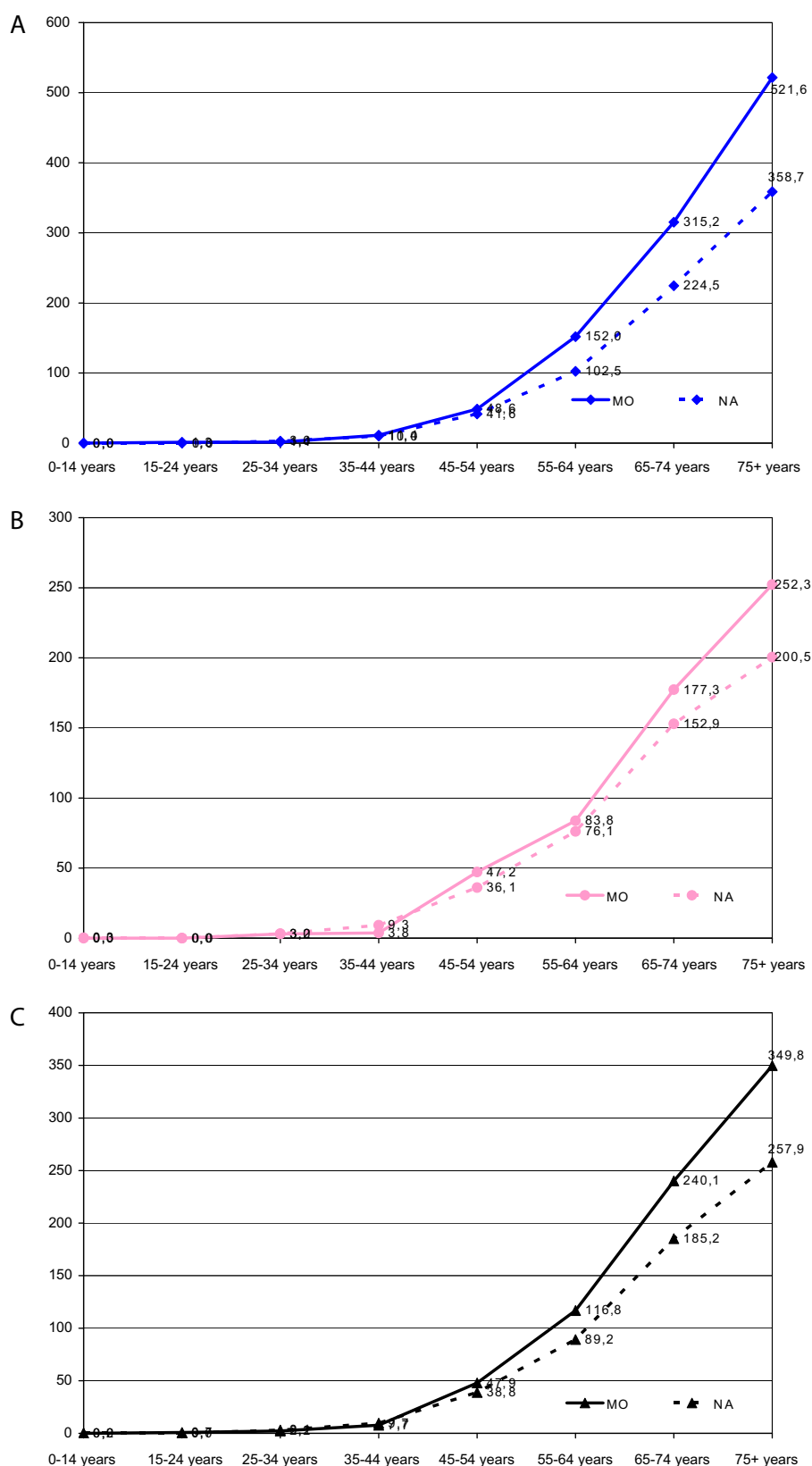
Total incident cases	Modena No. of cases (%)	Naples No. of cases (%)
Total patients	1406	1240
Males/females	806/600 (57.3/42.7%)	664/576 (53.5/46.5%)
Age classes (years)		
0–14	0 (0%)	2 (0.2%)
15–24	1 (0.1%)	0 (0%)
25–34	6 (0.4%)	17 (1.4%)
35–44	21 (1.5%)	49 (4.0%)
45–54	110 (7.8%)	153 (12.3%)
55–64	246 (17.5%)	268 (21.6%)
65–74	435 (30.9%)	406 (32.7%)
75+	587 (41.7%)	345 (27.8%)
TNM stage <sup>a</sup>		
I	256 (18.2%)	140 (11.3%)
II	411 (29.2%)	317 (25.6%)
III	367 (26.1%)	244 (19.7%)
IV	279 (19.8%)	377 (30.4%)
Not staged	93 (7.0%)	162 (13.0%)

a Stage I ( $T_{1-2}N_0M_0$ ), tumours limited to the bowel wall; Stage II ( $T_{3-4}N_0M_0$ ), tumours spread through the muscular wall into the surrounding tissues; Stage III ( $T_{1-4}N_{1-2}M_0$ ), metastasis in the lymph nodes are present; Stage IV ( $T_{1-4}N_{0-2}M_1$ ), refers to tumours with distant metastasis (usually liver and/or lung) (Ref. [16]).

the age of 54; afterwards the forceps begins to open, more markedly in males than in the female sex, thus indicating an absolute excess of incident cases in the series of Modena.

Table 2 shows crude and age-standardised incidence, cumulative risks and crude mortality for colorectal neoplasms in the two investigated series. As expected on the basis of previous reports,<sup>12</sup> the rates are higher in Northern areas (Modena) than in the South Italy (Naples), though the differences tend to attenuate for age-standardised rates, thus indicating a certain effect of the population structure. Differences in survival are depicted in Figs. 2 and 3. When all patients are considered together, the more favourable outcome observed in the series of Modena results quite clear; however, when the data are expressed by stage (Fig. 3) survival curves do not show any appreciable difference. This suggests that the less favourable survival observed in Naples is probably attributable to the relative excess of patients with advanced lesions. In accordance with this contention, when the two series were analysed by stage at diagnosis (Table 1), there was an excess of early lesions and a limited impact of advanced tumours in the series of Modena, while the opposite was seen in Naples.

When surgery was taken into account (Table 3), we did not observe appreciable differences for the most frequent operative approaches. However, abdominoperineal resections were carried out more frequently in Naples, while endoscopic polypectomy and hemicolectomy were less frequent. Moreover, unspecified interventions and not operated patients were more frequent in the Registry of Naples for patients with metastatic lesions. Rather unexpectedly, more patients were treated with adjuvant or palliative chemotherapy in Naples than in



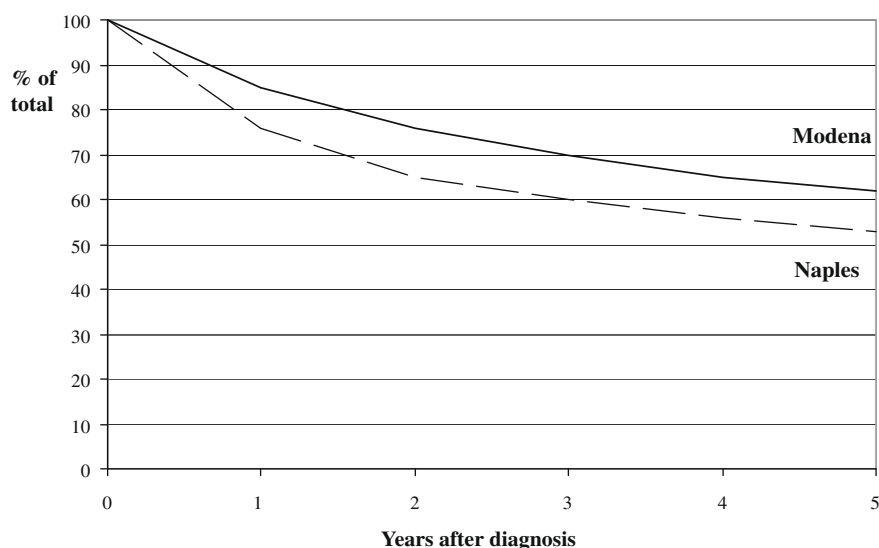
**Fig. 1 – Age-specific incidence rates (x 100,000/year) observed in Modena and Naples in the male sex (Panel A), in females (Panel B) and in the two sexes considered together (Panel C).**

Modena (Table 4), even within each TNM Stage ( $P < 0.001$ ). This may appear as a paradox, if we consider the overall less favour-

able prognosis seen in Naples. Of possible relevance is the fact that in Modena most of the patients (85%) were operated in the

**Table 2 – Crude, age-standardized incidence and mortality rates and cumulative risks for colorectal tumours, according to sex, during the period 2000–2005, in Modena and Naples.**

Incidence	Crude	Age-standardised incidence (×100,000)			Cumulative risks (×100)		
		Italy 1981	Europe	World	0–54	0–74	0–85+
<i>Modena</i>							
Males	97.7	65.5	68.4	45.5	0.6	5.2	12.3
Females	68.9	47.2	39.3	26.7	0.5	3.1	6.7
Total	82.9	56.4	51.8	35.0	0.6	4.1	9.0
<i>Naples</i>							
Males	41.1	46.7	49.1	33.0	0.5	3.8	7.2
Females	34.5	40.5	37.9	23.2	0.5	2.8	4.7
Total	37.8	43.6	40.3	27.4	0.5	3.3	5.7
Mortality	Crude	Age-standardised incidence (×100,000)			Cumulative risks (×100)		
		Italy 1981	Europe	World	0–54	0–74	0–85+
<i>Modena</i>							
Males	40.0	26.2	27.6	18.0	0.2	2.0	5.4
Females	23.0	15.0	12.3	8.2	0.2	0.9	2.4
Total	31.3	20.7	18.9	12.5	0.2	1.4	3.6
<i>Naples</i>							
Males	16.8	19.3	20.7	12.8			
Females	14.4	17.0	13.3	8.6			
Total	15.6	18.1	16.3	10.2			

**Fig. 2 – Relative survival for the 1406 incident cases registered in Modena (—) and the 1240 in Naples (-----).**

two University Teaching Hospitals, whereas in Naples incident cases were operated in a total of 63 Hospitals, including 27 Private Clinics, 33 Regional Public Hospitals and 2 University Centers. We did not observe any difference in the adherence to endoscopic follow-up, which was executed – in both series – by approximately 50% of the operated patients.

Finally, the results of a regression analysis in which the prognostic significance of several variables is taken into consideration are illustrated in Table 5. Site of the Registry (Modena or Naples), gender and site of neoplasms (colon or rectum) were not significantly related to prognosis. In contrast, age at diagnosis and, in particular, pathological stage were closely associated with the clinical outcome.

#### 4. Discussion

The results of the present study suggest that differences in colorectal cancer survival reported between Northern and Southern Italian regions are probably due to a different stage at diagnosis, which appears to be less favourable in a larger fraction of cases diagnosed in the South (in this case Naples). Other factors – such as type of surgery, medical therapy and follow-up – seem to play little or no role. It is presumable – although not yet tested – that a similar explanation can be proposed for interpreting differences in survival reported among other Italian Registries.<sup>12</sup> In addition, the study confirms that incidence rates of colorectal malignancies are

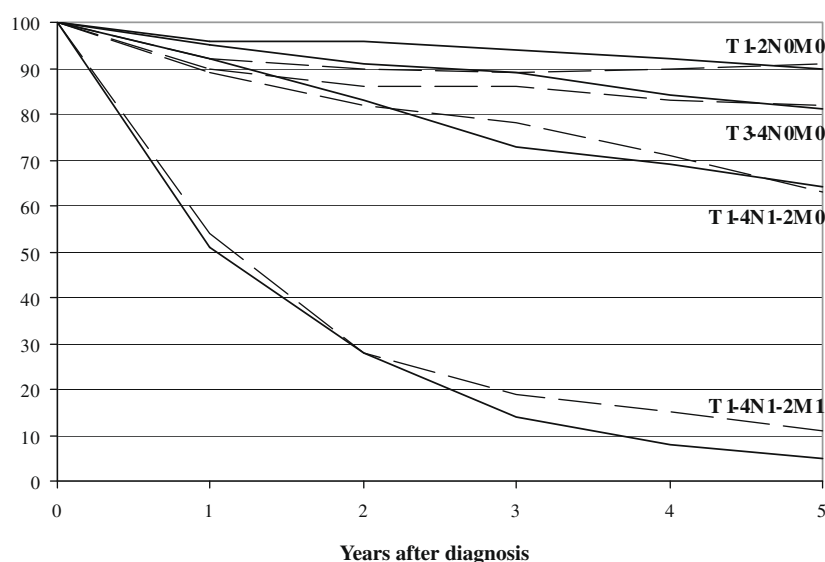


Fig. 3 – Relative survival in the two groups of patients by TNM stage (Modena —; Naples - - - - -).

**Table 3 – Main surgical operations executed in Modena and Naples during the study period 2000–2005 in patients with colorectal malignancies by stage (number of cases, %).**

Modena	Stage I	Stage II	Stage III	Stage IV	Not staged	Total
Hemicolectomy (right and left)	83 (32.4)	240 (58.4)	192 (52.3)	98 (35.1)	4 (4.3)	617 (49.3%)
Segmental resection	108 (42.2)	134 (32.6)	142 (38.7)	83 (29.8)	18 (19.4)	485 (34.5%)
Miles operations	8 (3.1)	11 (2.7)	15 (4.1)	3 (1.1)	1 (1.1)	38 (2.7%)
Endoscopic polypectomy	36 (14.1)	0 (0.0)	0 (0.0)	0 (0.0)	8 (8.6)	44 (3.1%)
Total or subtotal colectomy	5 (2.0)	15 (3.6)	13 (3.5)	5 (1.8)	2 (2.1)	40 (2.8%)
Palliative surgery	0 (0.0)	0 (0.0)	0 (0.0)	23 (8.2)	10 (10.8)	33 (2.3%)
Not operated	3 (1.2)	0 (0.0)	0 (0.0)	62 (22.2)	43 (46.2)	108 (7.7%)
Others and unspecified	13 (5.1)	11 (2.7)	5 (1.4)	5 (1.8)	7 (7.5)	41 (2.9%)
Naples	Stage I	Stage II	Stage III	Stage IV	Not staged	Total
Hemicolectomy (right and left)	40 (31.7)	157 (47.0)	114 (46.5)	141 (13.3)	22 (11.7%)	474 (38.2%)
Segmental resection	53 (42.1)	142 (42.5)	101 (41.2)	102 (27.0)	34 (18.2%)	432 (34.8%)
Miles operations	13 (10.3)	17 (5.1)	12 (4.9)	11 (2.9)	5 (2.6%)	58 (4.6%)
Endoscopic polypectomy	11 (8.7)	0 (0.0)	0 (0.0)	1 (0.3)	0 (0.0%)	12 (1.0%)
Total or subtotal colectomy	0 (0.0)	7 (2.1)	14 (5.7)	9 (2.4)	4 (2.1%)	34 (2.7%)
Palliative surgery <sup>a</sup>	0 (0.0)	0 (0.0)	0 (0.0)	19 (5.0)	0 (0.0%)	0 (0.0%)
Not operated	2 (1.6)	1 (0.3)	1 (0.4)	31 (8.2)	8 (4.2%)	43 (3.4%)
Others and unspecified	7 (5.6)	10 (3.0)	3 (1.2)	64 (16.9)	103 (55%)	187 (15%)

a Not specified.

appreciably lower in Southern Italy when compared to the North; moreover, our observations clearly indicate that the excess of cases seen in Modena (versus Naples) is limited to the age group 55–75+ years, while age-specific incidence rates are virtually identical, for both sexes, in the younger age classes.

In between-country comparisons, differences in survival have frequently been reported, for colorectal as well as other neoplasms, even when the study was limited to well-developed and industrialised countries. Thus, Gatta et al.<sup>10</sup> showed that colorectal cancer survival differed substantially between various European countries: Nordic countries, France, Austria and Switzerland were characterised by high survival, while Eastern Europe and, rather surprisingly, United Kingdom

and Denmark showed relatively low survival rates. With a similar approach, Monnet et al.<sup>22</sup> reported significant differences in rectal cancer survival between three European Registries (Geneva, Switzerland; Côte d'Or, France and Mallorca, Spain), and showed that the observed pattern could be attributed to stage at diagnosis. The authors concluded that diagnostic conditions appeared to be the main determinant of the survival inequalities. Gatta, Ciccolallo and colleagues<sup>23</sup> were led to similar conclusions by examining differences of survival for colorectal tumours between European countries and United States; the authors emphasised that such differences were large and mostly attributable to stage at diagnosis. These international comparisons are of interest since can shed light on several aspects of cancer epidemiology and



**Table 4 – Medical treatment of patients with colonic malignancies registered in Modena and Naples during the study period 2000–2005.**

5-FU-based chemotherapy	Modena No. of cases (%)	Naples No. of cases (%)
Yes	380 (37.2%)	402 (57.2%)
No	641 (62.8%)	301 (42.8%)
Chemotherapy by TNM Stage		
I	0 (0.0%)	9 (12.5%)
II	100 (30.0%)	119 (54.8%)
III	171 (57.4%)	100 (67.1%)
II + III	271 (42.9%)	219 (59.8%)
IV	109 (51.2%)	174 (65.7%)

biological features, including different styles of life, more or less enthusiasm towards screening and early diagnosis, relevance given to premalignant lesions, and role of information in cancer prevention and treatment.<sup>24</sup>

Among human tumours colorectal neoplasms appear as those more closely related to pathological stage at diagnosis, in the sense that the destiny of a patient can be predicted with accuracy – at least in the majority of cases – when the pathologist has completed the examination. It is therefore not surprising that the survival differences observed between incident cases of Modena and Naples could be largely explained by a different stage. One possible reason for this can be searched in the attitude of the population towards colorectal cancer screening. Starting from the early 90 years, several screening campaigns have been launched in Northern Italian regions, with a reasonable level of acceptance by the population. As far as colorectal neoplasms were concerned, either sigmoidoscopy or fecal occult blood tests (followed by colonoscopy, for positive cases) have been proposed.<sup>25,26</sup> It is likely that these interventions of Public Health were sufficient to generate a climate favourable to screening, leading several individuals to accept testing even in the absence of symptoms, or to undergo colonoscopy when a first-degree relative was affected by tumour of the large bowel. With a few exceptions, screening campaigns were not initiated in Southern Italian regions and, consequently, the general attitude towards screening and early diagnosis is characterised by indifference, if not overt reluctance. It is also possible that the different social and economic background (the South of Italy is less industrialised, more rural and, in general terms, less

wealthy than the North) contributed to hamper the diffusion of preventive medicine in Southern regions. Thus, the more favourable stage and the better survival recorded in Modena could be a direct consequence of the growing popularity of screening procedures. A more technical explanation, difficult to test in our series of patients, could be the well-known phenomenon of ‘stage migration’, consisting in the shift towards a more favourable stage due to the unequal availability of new endoscopic, imaging and histological procedures used to determine stage.<sup>23</sup>

As expected, type of surgery, medical treatment and post-operative follow-up did not show appreciable differences between the two series. However, we noticed that in Naples colorectal cancer patients were treated in a multitude of small Hospitals and Private Clinics, whereas in Modena the large majority of cases were followed in the two main University Teaching Hospitals. Even in the absence of direct evidence, it is possible that this dispersion of cases may have induced, at least in some circumstances, a less scrupulous application of the accepted guidelines and reference standards for management of colorectal neoplasms.<sup>27</sup> The observed tendency to medical over-treatment seems to be a direct consequence of this contention. Since the operative volume is a well-known prognostic factor in colorectal cancer,<sup>28</sup> we cannot exclude that the dispersion of patients could have contributed to the lower survival observed in Naples.

Data of descriptive epidemiology, summarised in Table 2, confirm that in Southern Italian regions incidence rates of colorectal tumours are lower than in Northern areas.<sup>12</sup> It is noteworthy that differences appeared smaller when age-standardised rates were compared; moreover, there is evidence that the gradient tends to attenuate over time.<sup>29</sup> The observed differences of age-specific incidence rates between the two series are rather intriguing and somehow unexpected. However, several explanations can be proposed. First of all, it is entirely possible to imagine a certain under-diagnosis of incident cases in Naples, more marked in the most advanced classes of age. Older patients with colorectal malignancies might escape registration because they are reluctant to be hospitalised (an event more common in Southern Italy than in the North) or because they tend to minimise symptoms and signs. Moreover, migration to other hospitals outside the area covered by the Registry cannot be excluded. Second, we could hypothesise the presence of protective factors – mostly related to diet and style of life – for individuals born in Naples in the first half of the 20th century. The protective role of a Mediterranean diet against the development of colorectal tumours has been repeatedly suggested,<sup>30</sup> though

**Table 5 – Prognostic variables associated with the clinical outcome: results of a Multivariate Analysis (Cox model).**

Variables	Hazard ratio	Standard error	Z	P (<)	95% Confidential intervals
Naples versus Modena	0.94	0.06	–0.50	0.62	0.83–1.11
Female Versus male	0.95	0.06	–0.72	0.47	0.82–1.09
Dukes B versus Dukes A	2.37	0.46	4.40	0.00	1.61–3.49
Dukes C versus Dukes A	4.16	0.80	7.42	0.00	2.85–6.08
Dukes D versus Dukes A	23.0	4.28	16.9	0.00	0.92–1.23
Rectum versus colon	1.06	0.07	0.89	0.37	0.92–1.23
Age	1.03	0.00	9.95	0.00	1.02–1.03

not without controversies, and the consumption of meat and animal fat was rather limited in Southern Italy before the second World War. On the contrary we cannot exclude 'a priori' the possible existence of one or more risk factors for colorectal neoplasms for subjects born in Modena between 1900 and 1950. Finally, these hypothetical risk factors might require several decades to exert their effect, and this may explain the differences in age-specific incidence rates depicted in Fig. 1.

In conclusion, this is probably the first 'high-resolution' study which analyses and tries to interpret survival differences observed between two cancer Registries of the same country. The results confirm the fundamental importance of **stage** at diagnosis in the management of colorectal cancer, and suggest that social and economic factors are of relevance, even in Western countries, for reducing inequalities in cancer care.

### Conflict of interest statement

None declared.

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