Epidemiologia e controllo del melanoma

Fabrizio Stracci

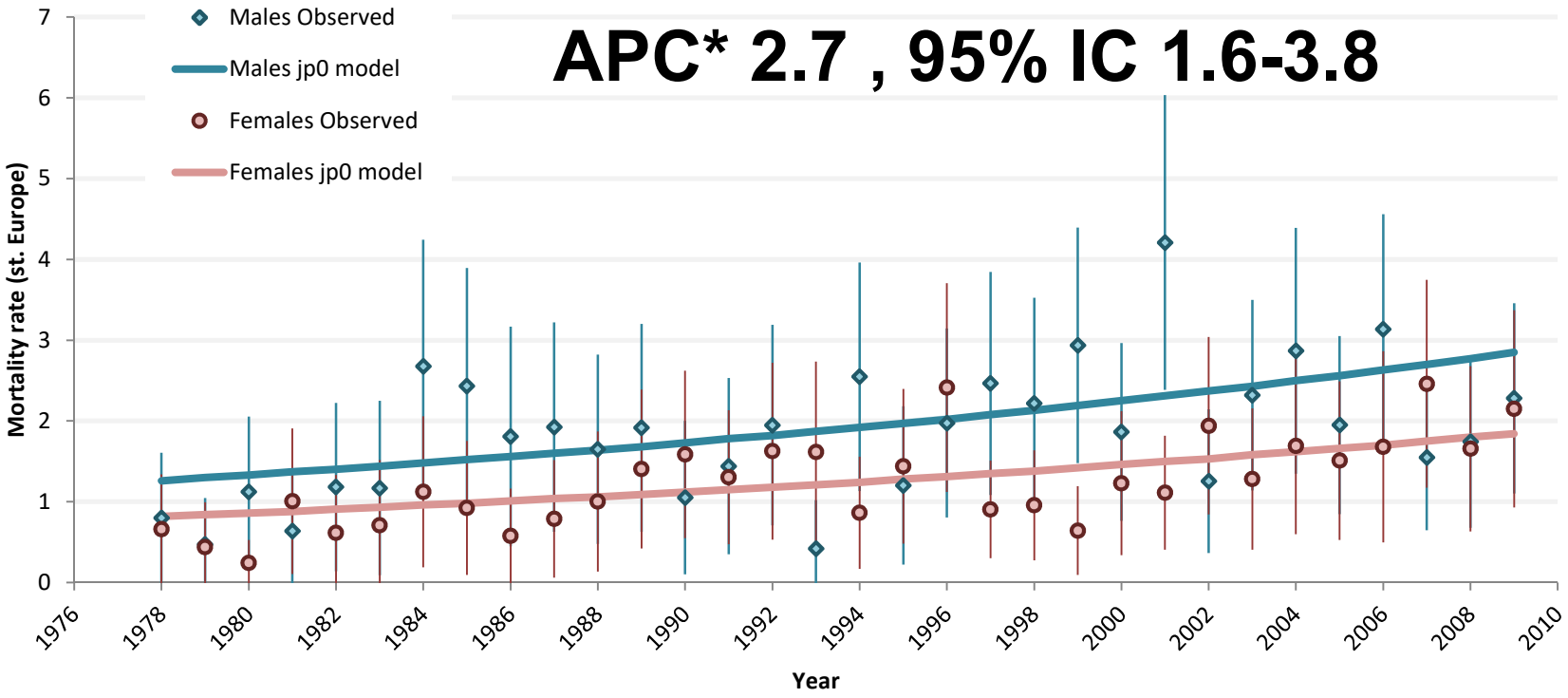
Incidenza e mortalità per sesso e periodo

	1994-1996	n. annuo	Tasso st.*	2006-2008	n. annuo	Tasso st.*
Femmine	Incidenza	36	6.4	Incidenza	57	9.9
	Mortalità	11	1.6	Mortalità	14	1.9
Maschi	Incidenza	32	6.4	Incidenza	56	9.8
	Mortalità	10	1.9	Mortalità	15	2.1

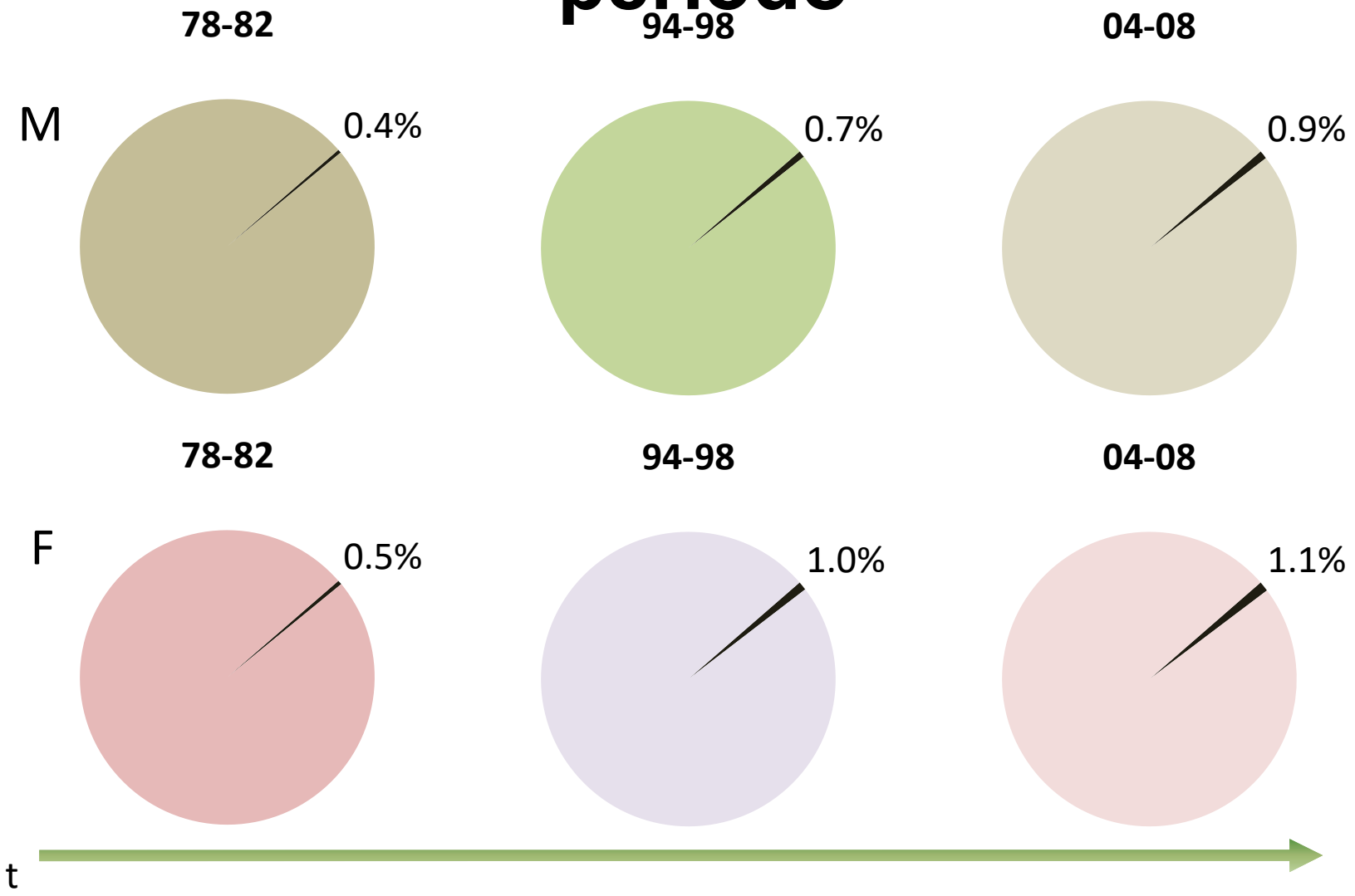
**** Per 100.000 ab. per anno ; standard : popolazione Europea***

Mortalità per melanoma della cute per sesso e anno

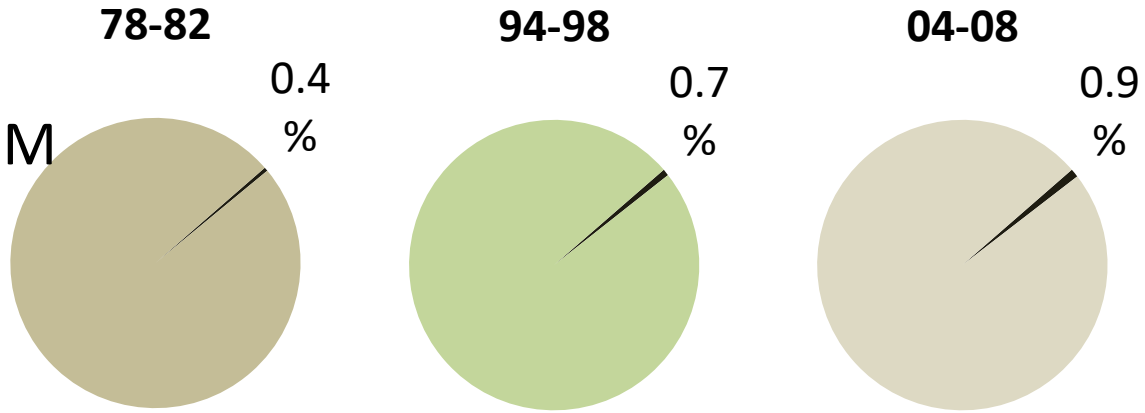
(segmenti paralleli possono essere descritti mediante un singolo coefficiente)

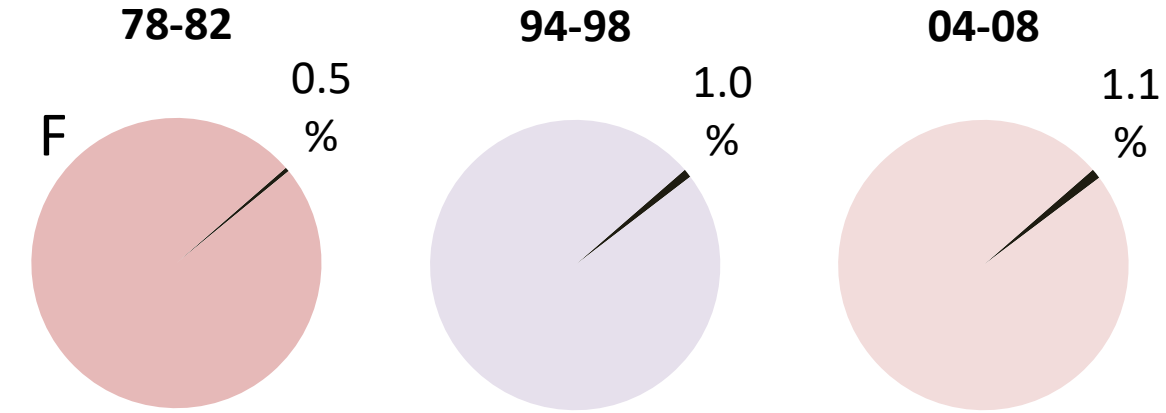


Mortalità proporzionale per melanoma della cute per sesso e periodo



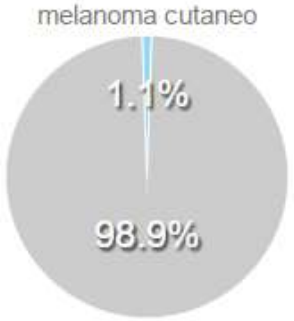
Mortalità proporzionale per melanoma della cute per sesso e periodo





t

95 casi nel periodo 2010-2014
In media 19 casi per anno



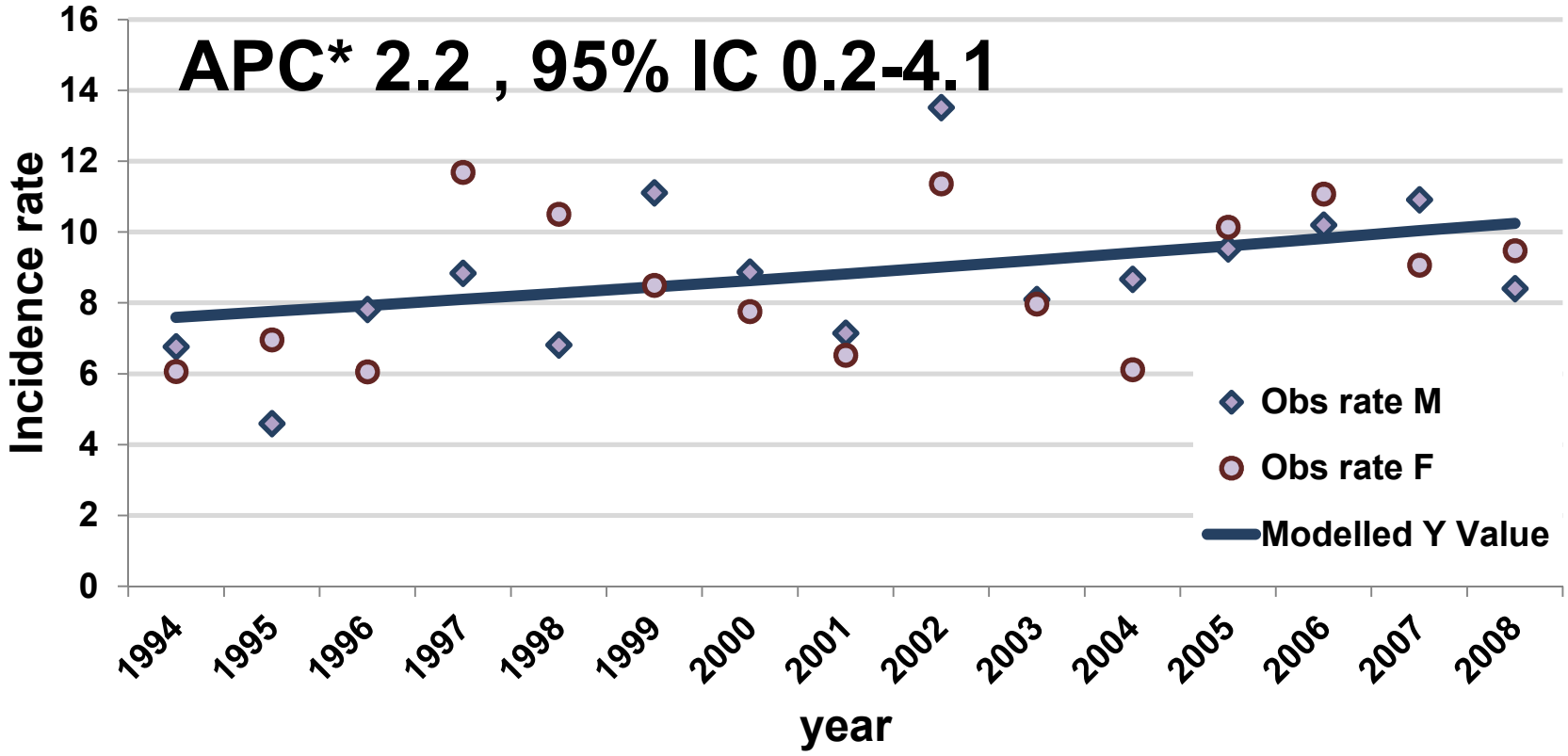
Tasso standardizzato per 100,000 abitanti, popolazione Italia 2011:
4.46

53 casi nel periodo 2010-2014
In media 11 casi per anno

Tasso standardizzato per 100,000 abitanti, popolazione Italia 2011:
1.96

Incidenza del melanoma della cute in Umbria per sesso – periodo 1994-2008

(il trend può essere riassunto da un unico segmento)



Incidenza del melanoma della cute per classe d'età e periodo

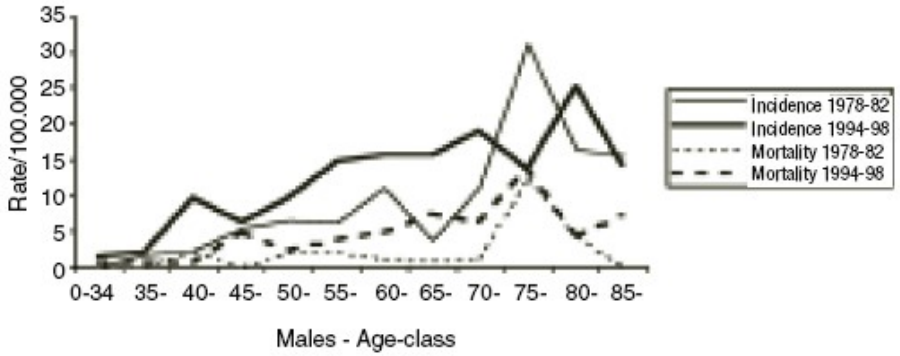
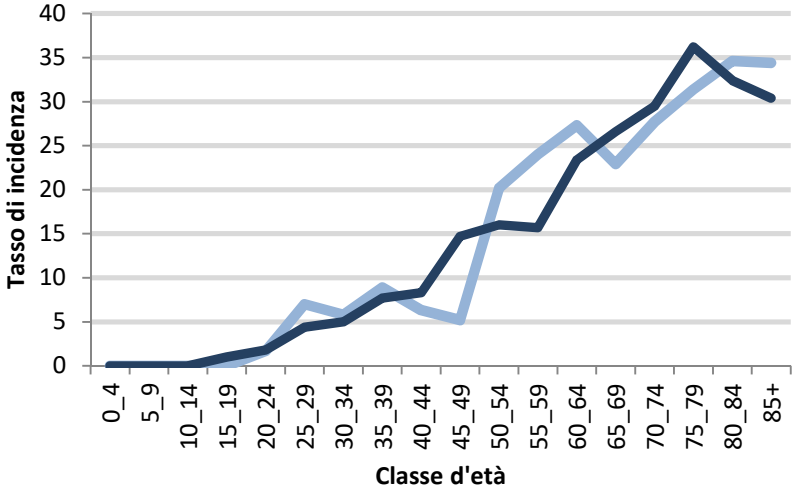
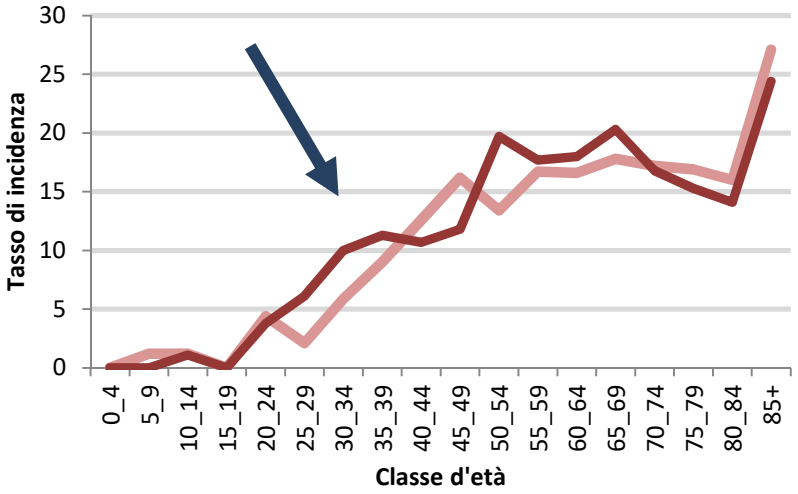


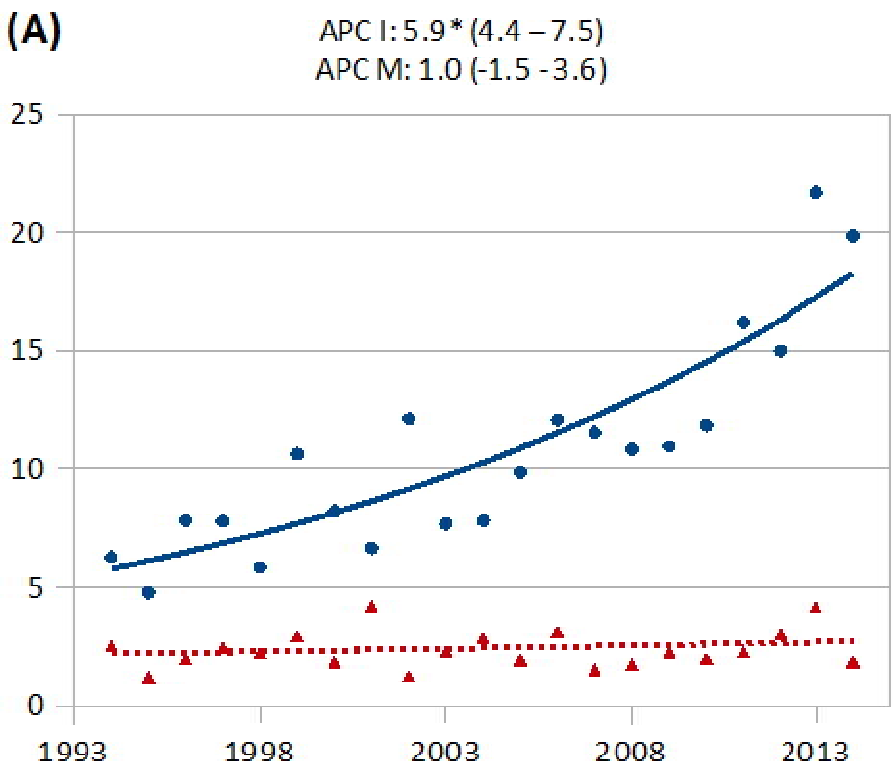
Figure 1 - Incidence and mortality from cutaneous melanoma by age class. Males and females, Umbria 1978-1982 and 1994-1998.



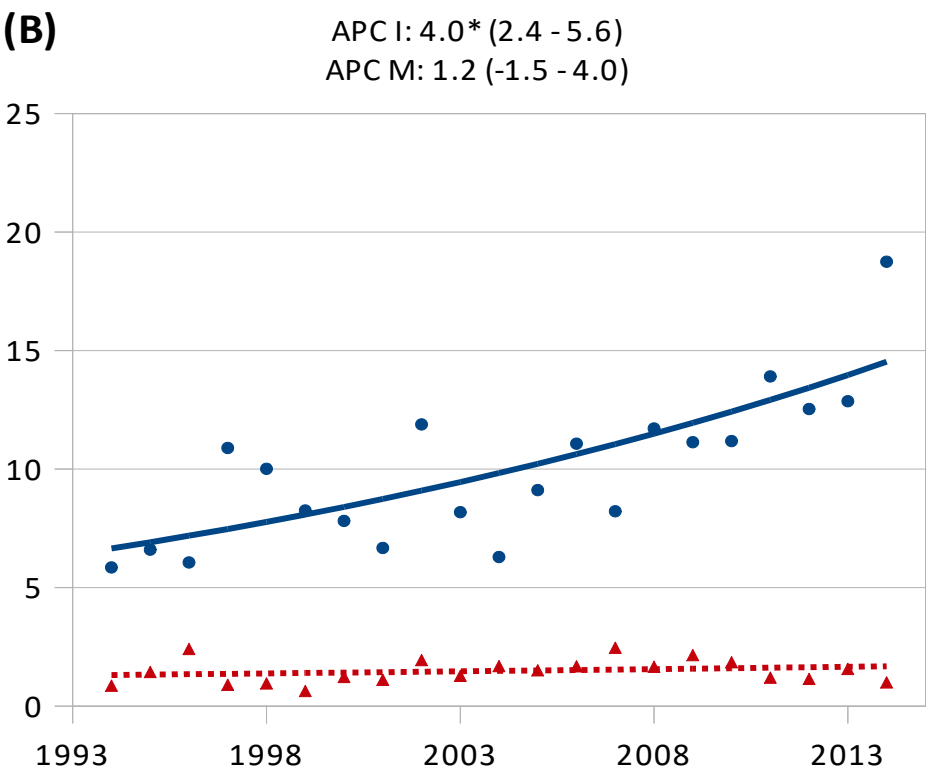


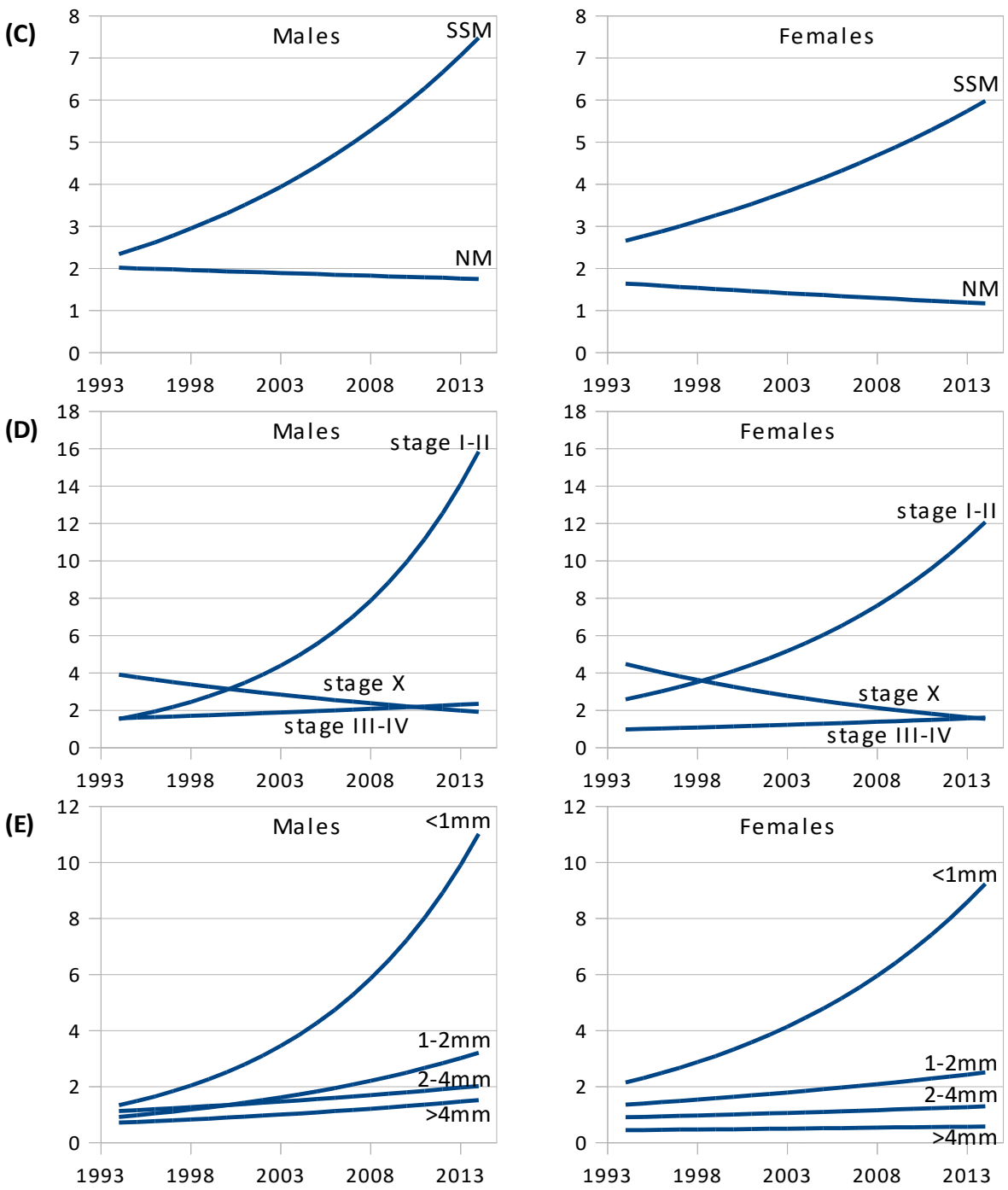
Incidenza e mortalità per melanoma in Umbria

males



females





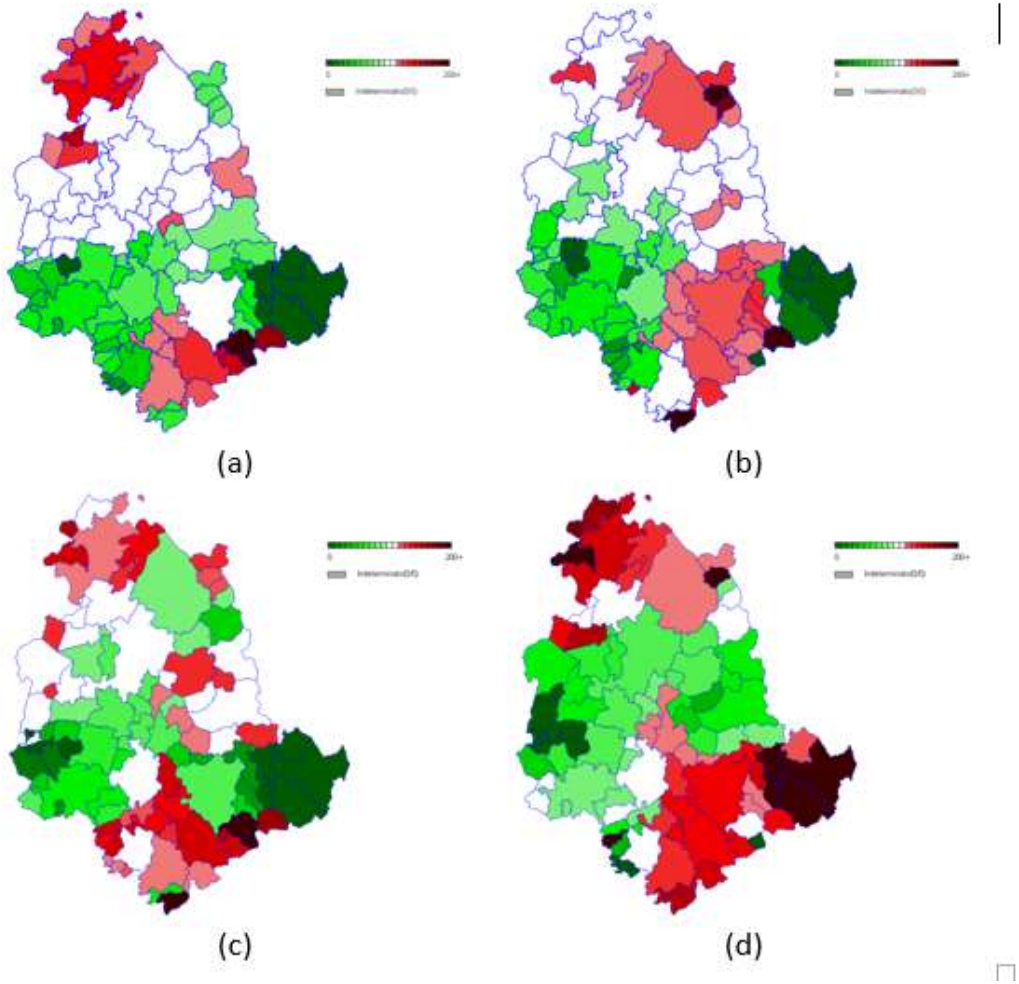
morfologia

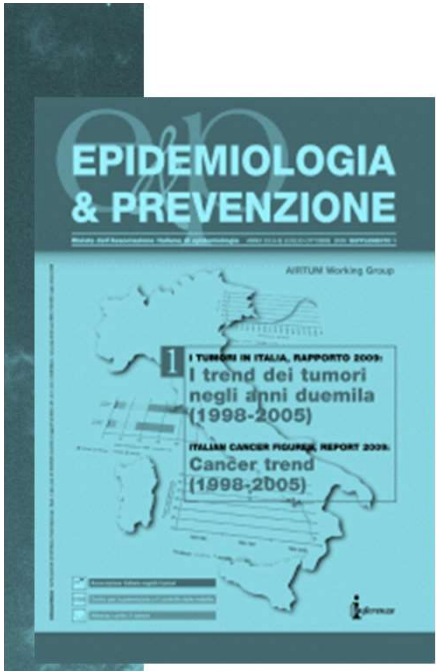
stadio

Breslow

Mappa mortalità e stadi avanzati

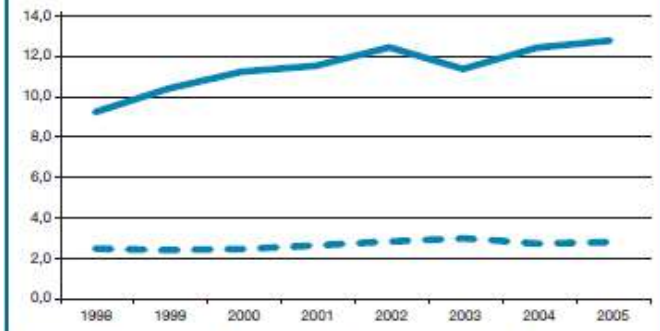
FIGURE 7. BYM maps for melanoma in Umbria in the period 2004-2014. (a) SMR for melanoma in males. (b) SMR for melanoma in females. (c) SIR for melanoma stage III-IV in males. (d) SIR for melanoma stage III-IV in females.





Standardized incidence and mortality rates x 100,000

MALE SKIN MELANOMA

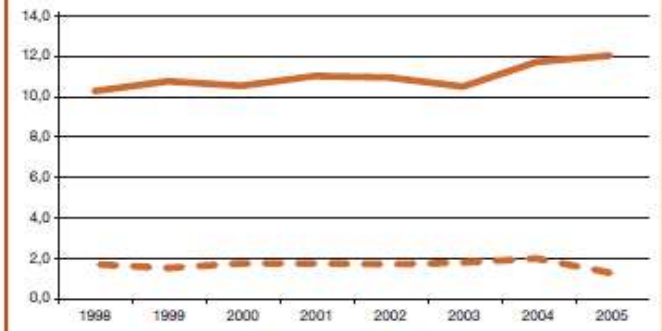


INCIDENCE 1998-2005 APC (95% CI) +3.8* (+1.8 ; +5.9)

MORTALITY 1998-2005 APC (95% CI) +2.6* (+0.6 ; +4.6)

Standardized incidence and mortality rates x 100,000

FEMALE SKIN MELANOMA

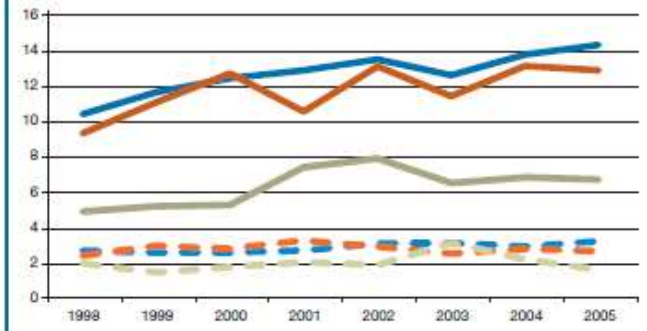


INCIDENCE 1998-2005 APC (95% CI) +1.9* (+0.5 ; +3.3)

MORTALITY 1998-2005 APC (95% CI) -0.3 (-5.8 ; +5.5)

Standardized incidence and mortality rates by area x 100,000

MALE SKIN MELANOMA

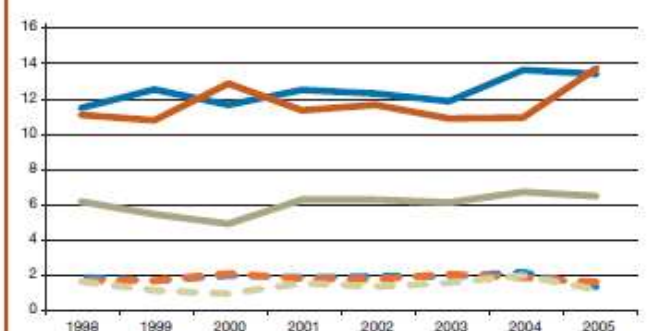


AREA	INCIDENCE
North	1998-2005 APC (95% CI) +3.8* (+2.0 ; +5.6)
Centre	1998-2005 APC (95% CI) +3.4 (-0.3 ; +7.3)
South	1998-2005 APC (95% CI) +4.8 (-1.1 ; +11.1)

AREA	MORTALITY
North	1998-2005 APC (95% CI) +3.3* (+1.1 ; +5.4)
Centre	1998-2005 APC (95% CI) -0.3 (-4.5 ; +4.0)
South	1998-2005 APC (95% CI) +3.8 (-6.7 ; +15.4)

Standardized incidence and mortality rates by area x 100,000

FEMALE SKIN MELANOMA

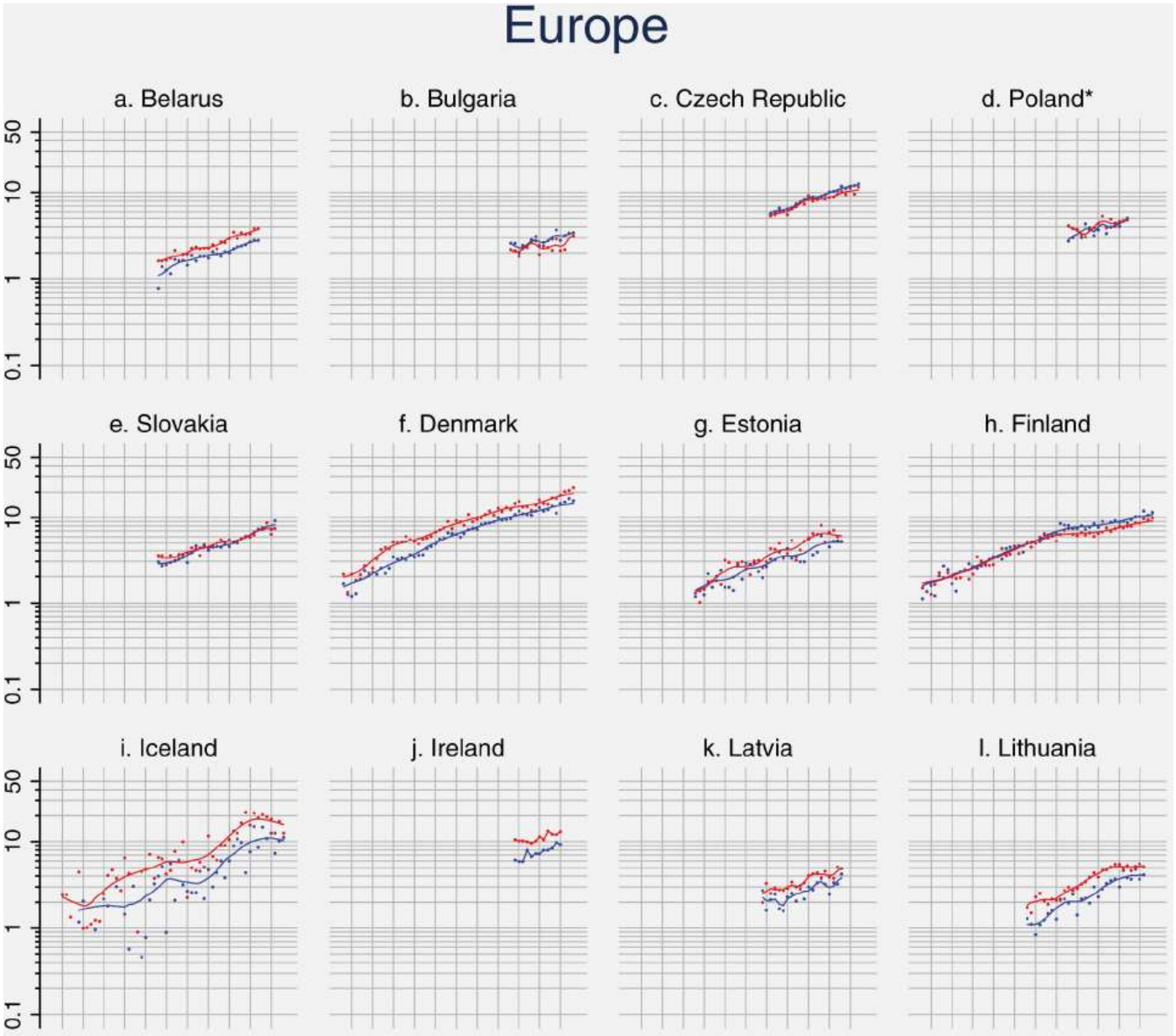


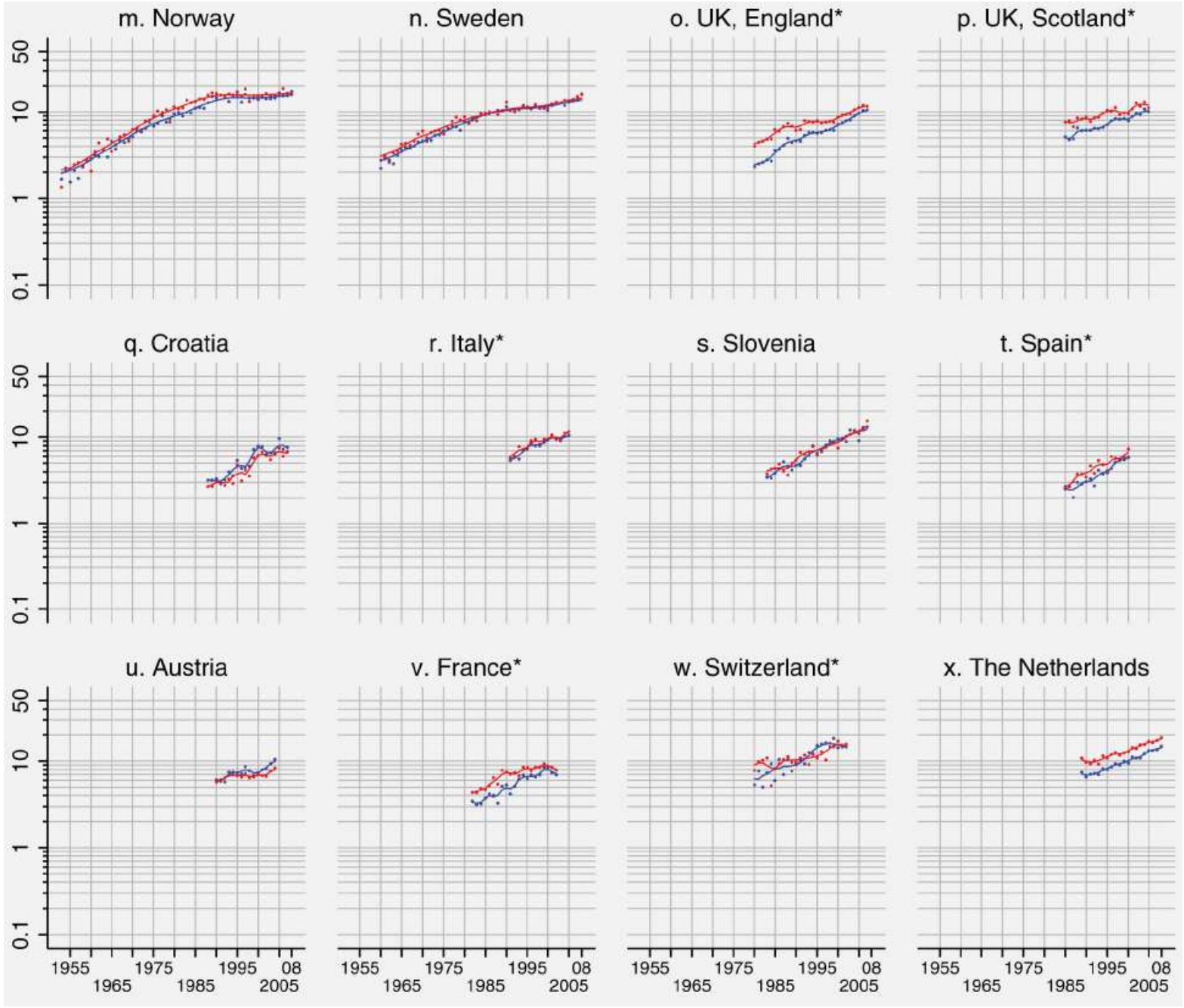
AREA	INCIDENCE
North	1998-2005 APC (95% CI) +1.9* (+0.1 ; +3.7)
Centre	1998-2005 APC (95% CI) +1.5 (-2.0 ; +5.1)
South	1998-2005 APC (95% CI) +2.4 (-0.9 ; +5.8)

AREA	MORTALITY
North	1998-2005 APC (95% CI) -1.0 (-7.0 ; +5.5)
Centre	1998-2005 APC (95% CI) -0.3 (-4.5 ; +4.0)
South	1998-2005 APC (95% CI) +2.4 (-7.8 ; +13.7)

I Tumori in Italia - Rapporto 2009 - I trend dei tumori negli anni duemila (1998-2005). *Epidemiol Prev* 2009; 33(4-5) suppl 1

Melanoma cutaneo: trend di incidenza in Europa




m. Norway
n. Sweden
o. UK, England*
p. UK, Scotland*
q. Croatia
r. Italy*
s. Slovenia
t. Spain*
u. Austria
v. France*
w. Switzerland*
x. The Netherlands
0.1
1
10
50
1955
1965
1975
1985
1995
2005
08

Erdmann F, Lortet-Tieulent J, Schüz J, Zeeb H, Greinert R, Breitbart EW, Bray F. International trends in the incidence of malignant melanoma 1953–2008—are recent generations at higher or lower risk? Int J Cancer. 2013;132:385-400.

The incidence of cutaneous malignant melanoma has steadily increased over the past 50 years in predominately fair-skinned populations.

… We analyzed the incidence data from 39 population based cancer registries… estimating the annual percentage change and incidence rate ratios from age-period-cohort models.

Incidence rates of melanoma continue to rise in most European countries (primarily Southern and Eastern Europe), whereas in Australia, New Zealand, the U.S., Canada, Israel and Norway, rates have become rather stable in recent years. Indications of a **stabilization or decreasing trend were observed mainly in the youngest age group** (25–44 years).

... In addition to the birth cohort effect, there was a suggestion of a period-related influence on melanoma trends in certain populations.

Although our findings provide support that **primary and secondary prevention can halt and reverse the observed increasing burden of melanoma**, they also indicate that those prevention measures require further endorsement in many countries.

Stime per tumori selezionati - Italia

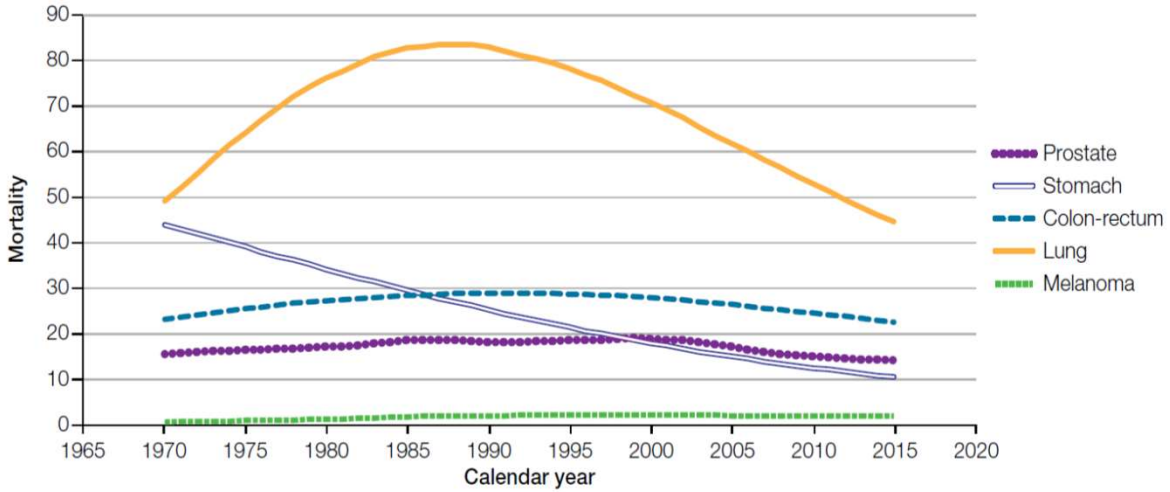


Figura 3 - Mortality estimates by cancer site in Italy in the period 1970-2015. Age-standardized rates (European population) per 100,000 person-years. Age 0-99 years, men.

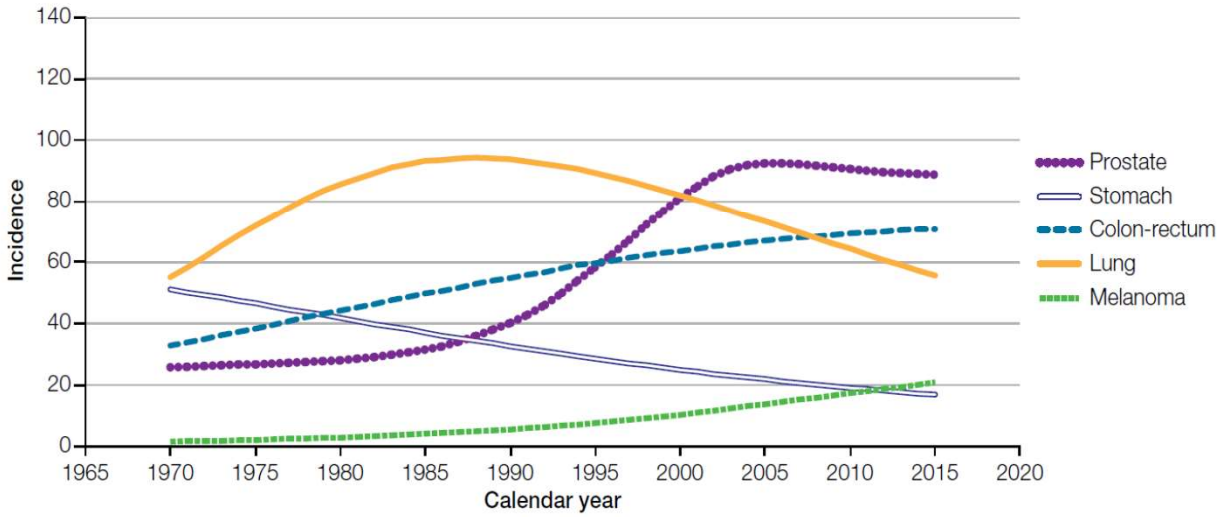


Figura 1 - Incidence estimates by cancer site in Italy in the period 1970-2015. Age-standardized rates (European population) per 100,000 person-years. Age 0-99 years, men.

Proiezioni e misure

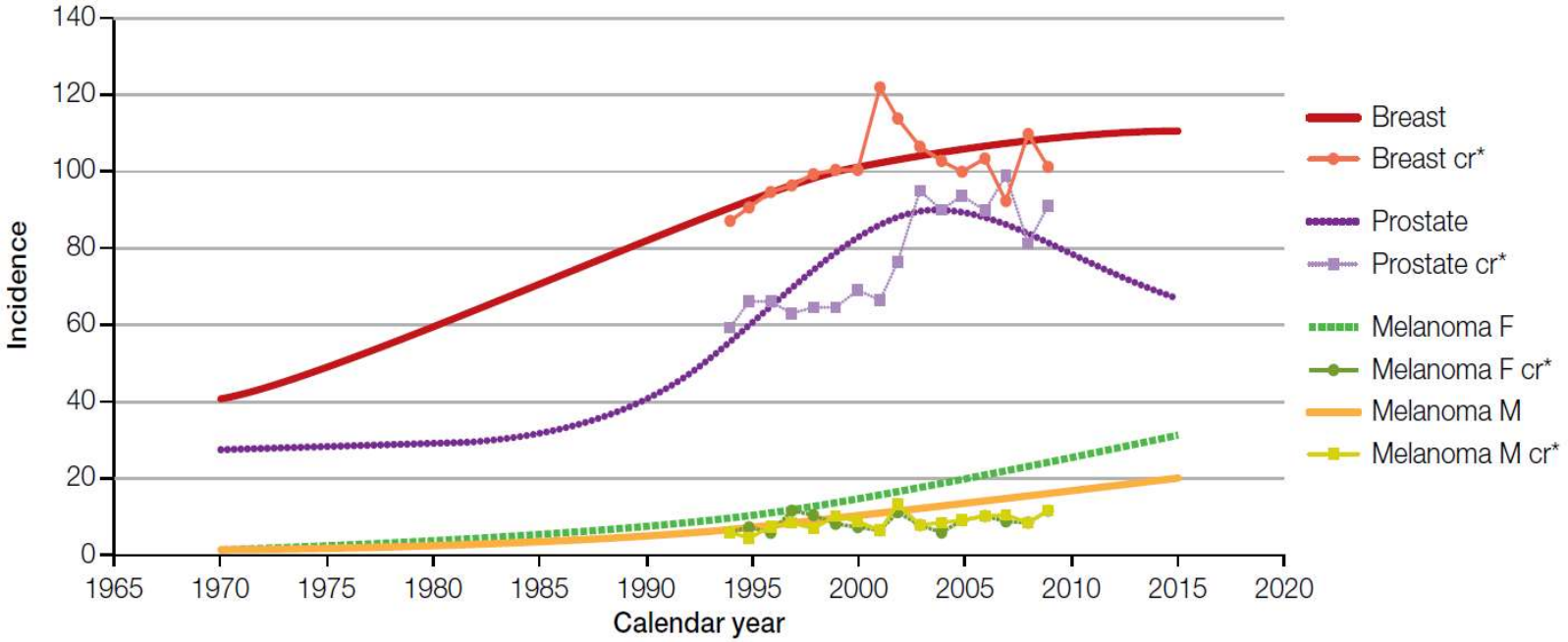
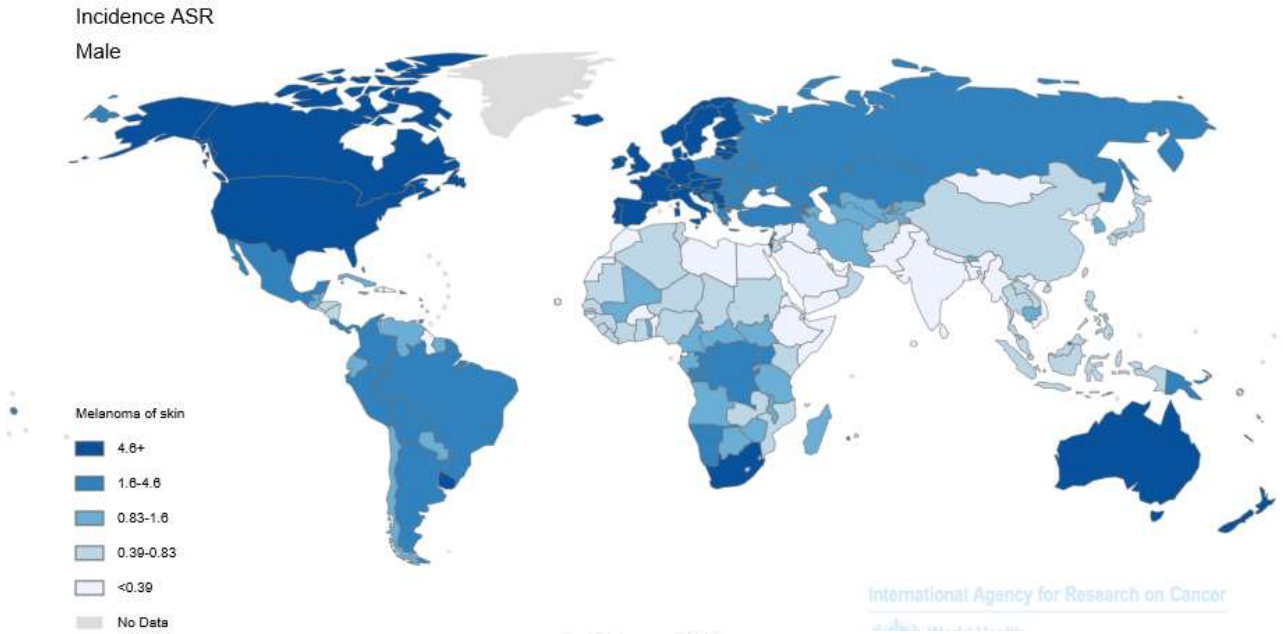
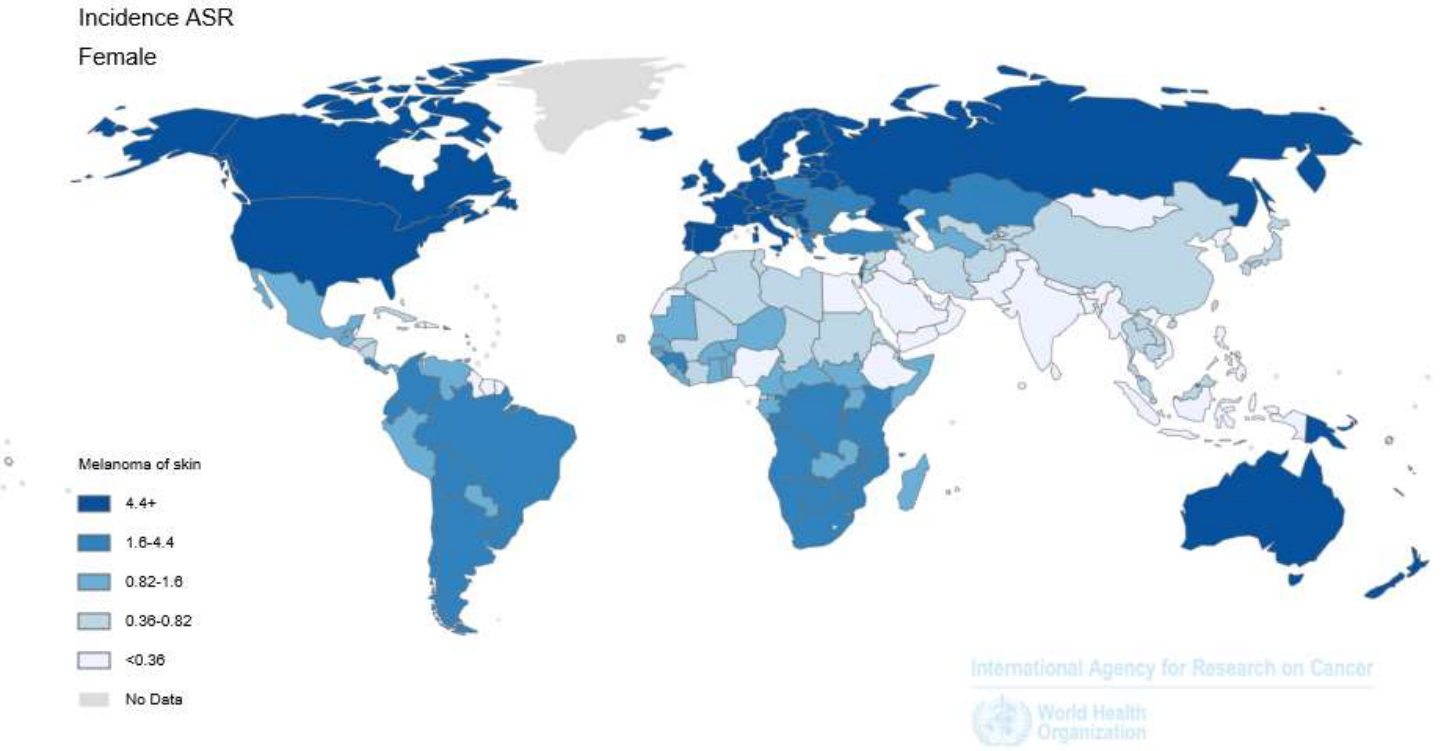


Figure 7 - Incidence, model-based estimates and observed cancer registry data for selected cancer sites. Age-standardized rate (European population) per 100,000 person-years. Age 0-99 years. M, males; F, females.
*cr = Umbria cancer registry data.

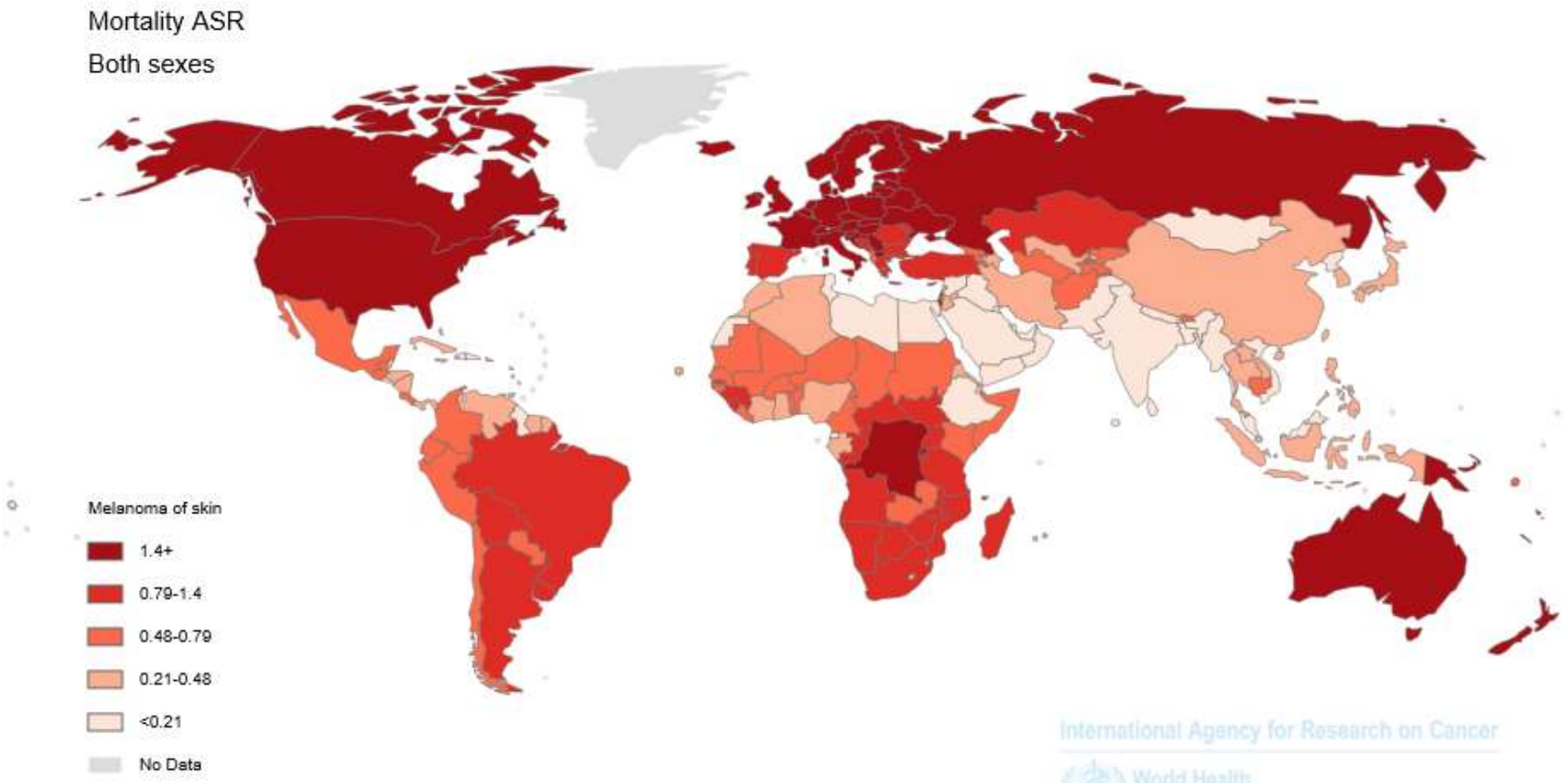


Stima dell'incidenza del melanoma della cute nel mondo (GLOBOCAN 2012)



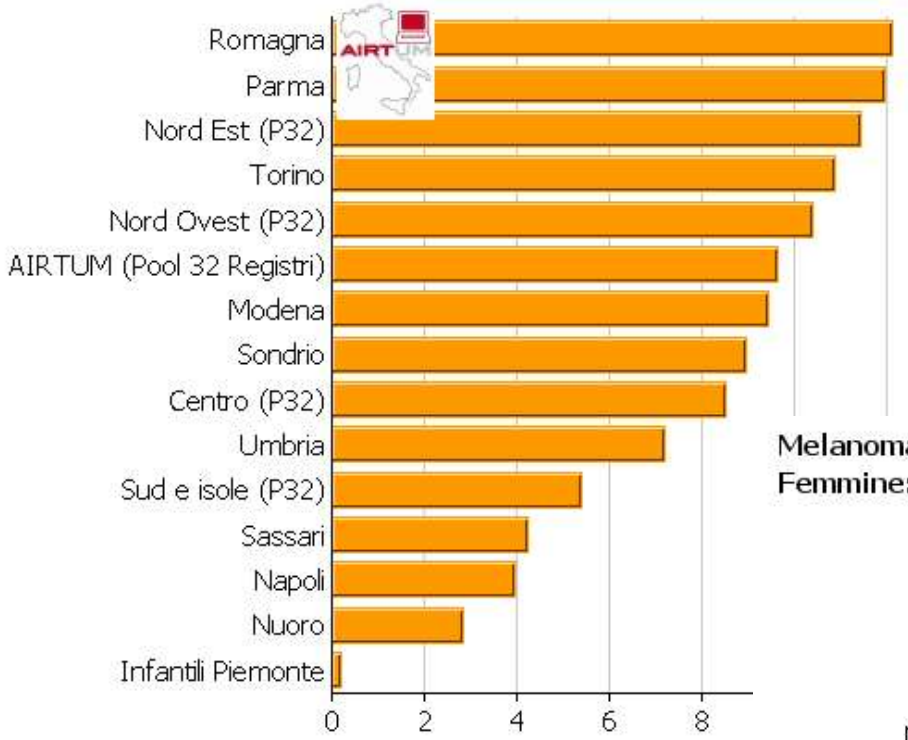
Source: GLOBOCAN 2012 (IARC)

Mortalità per melanoma della cute



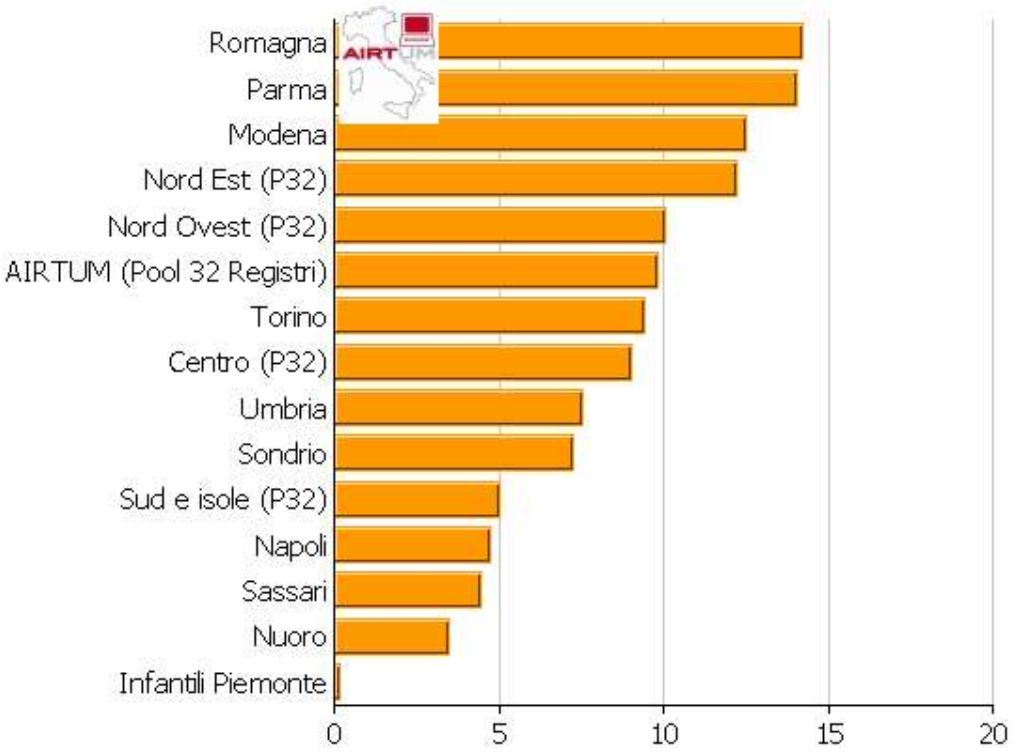
Source: GLOBOCAN 2012 (IARC)

Melanoma della pelle, Incidenza (2006-2008)
Maschi: TSE (Mondiale) età (0-85+)



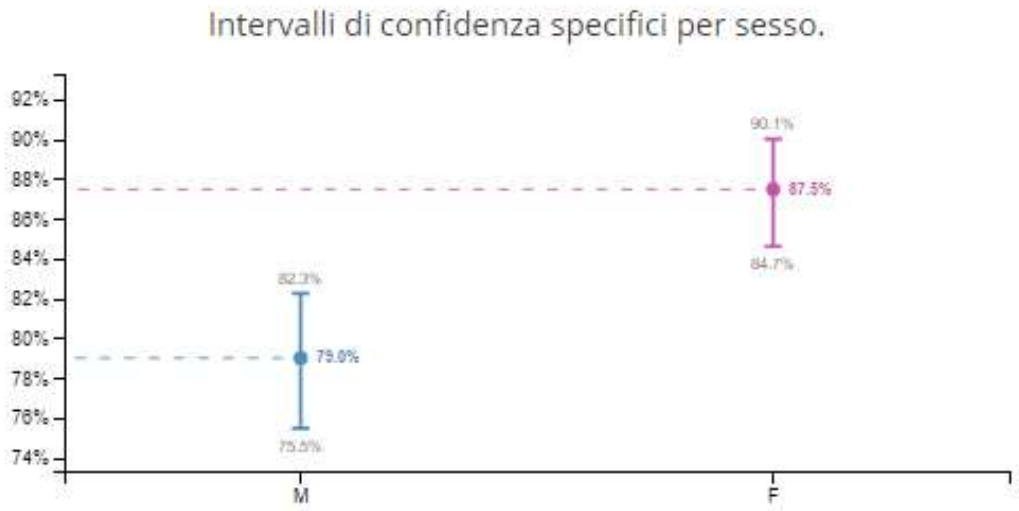
ITACAN © Italian Association of Cancer Registries (AIRTUM) (15.12.2013)

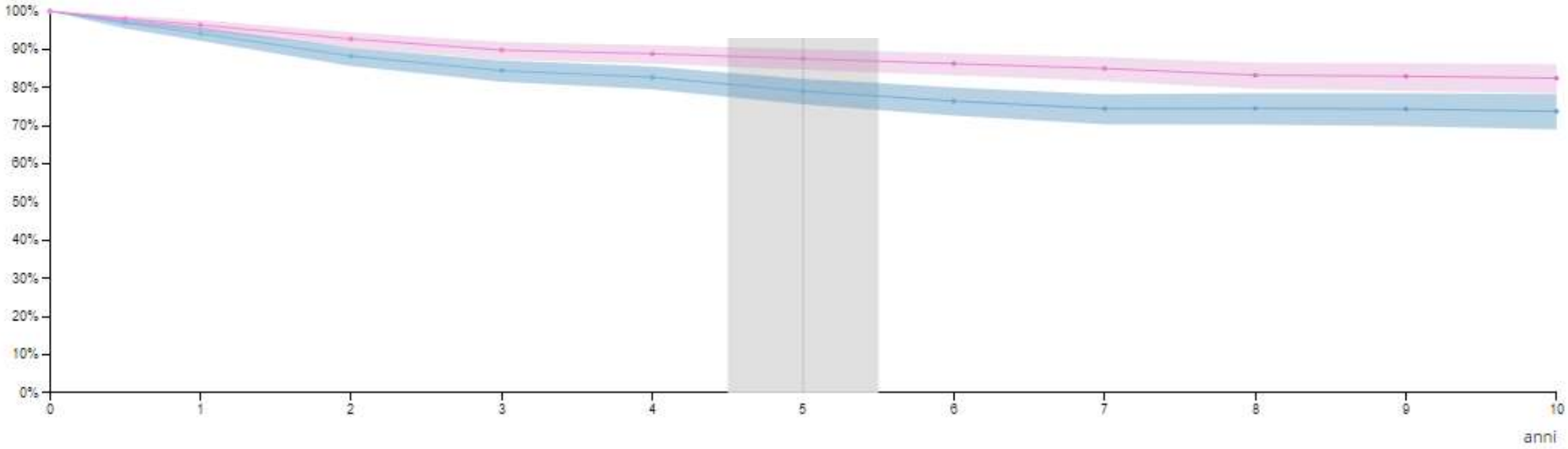
Melanoma della pelle, Incidenza (2006-2008)
Femmine: TSE (Mondiale) età (0-85+)



ITACAN © Italian Association of Cancer Registries (AIRTUM) (15.12.2013)

SOPRAVVIVENZA


Intervalli di confidenza specifici per sesso.
92%
90%
88%
86%
84%
82%
80%
78%
76%
74%
90.1%
87.5%
84.7%
82.3%
79.0%
75.5%
M
F


100%
90%
80%
70%
60%
50%
40%
30%
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1
2
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8
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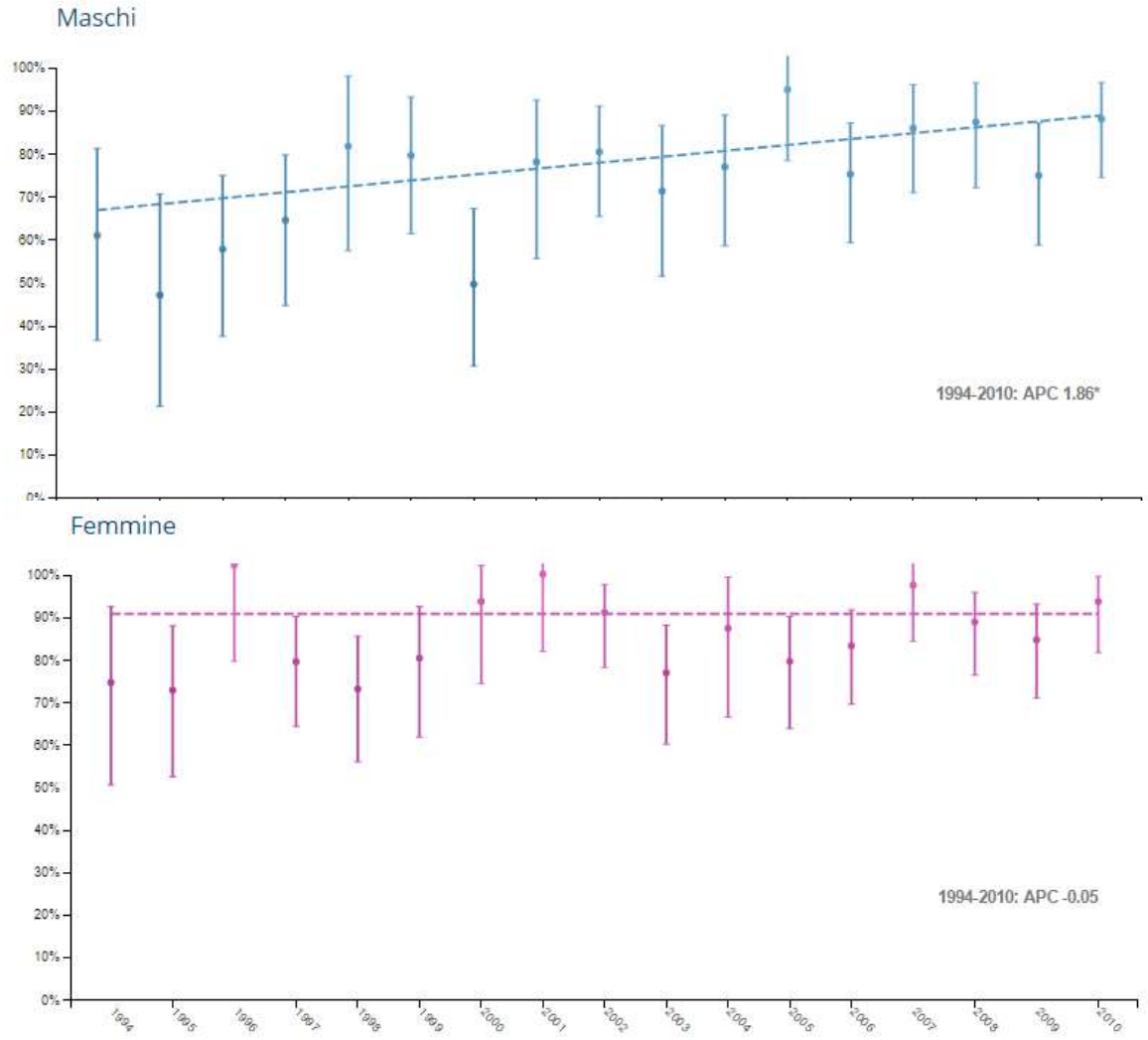
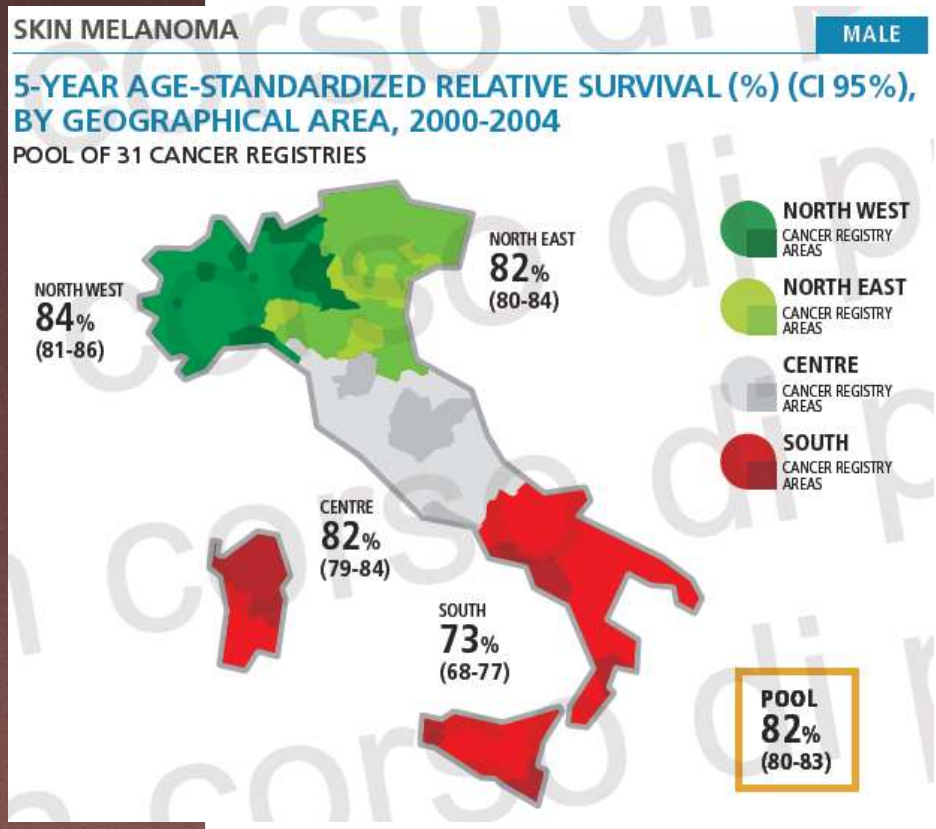
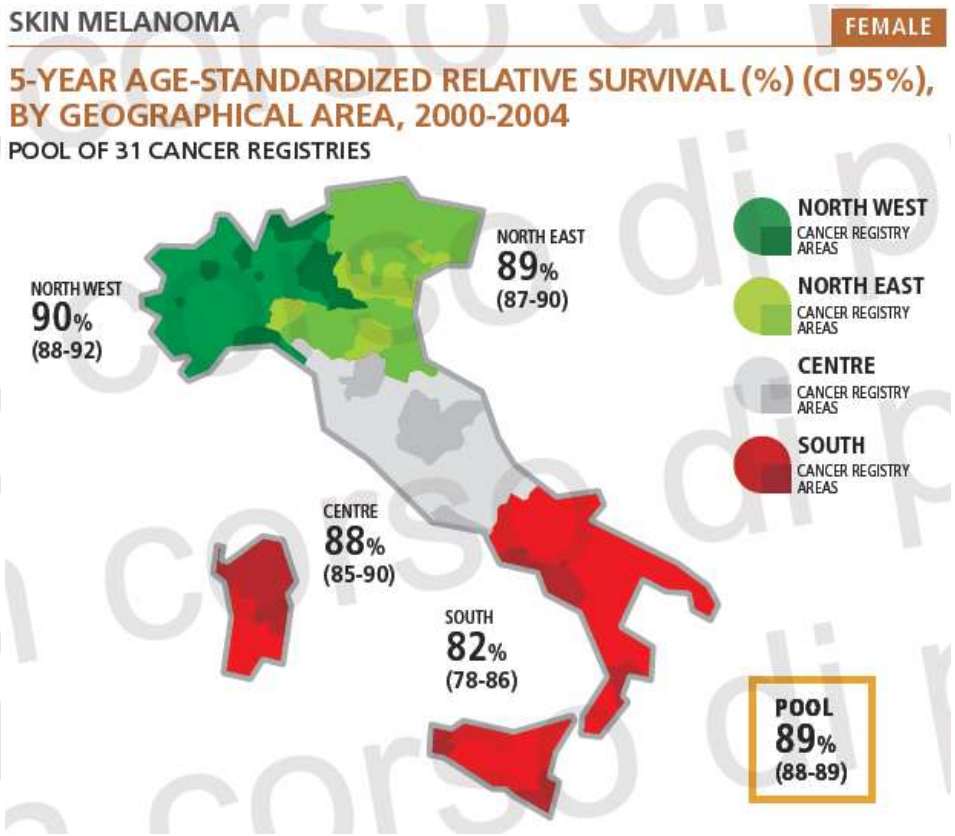
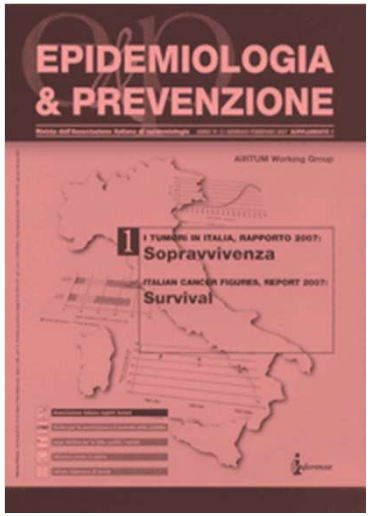
10
anni

Trend di sopravvivenza

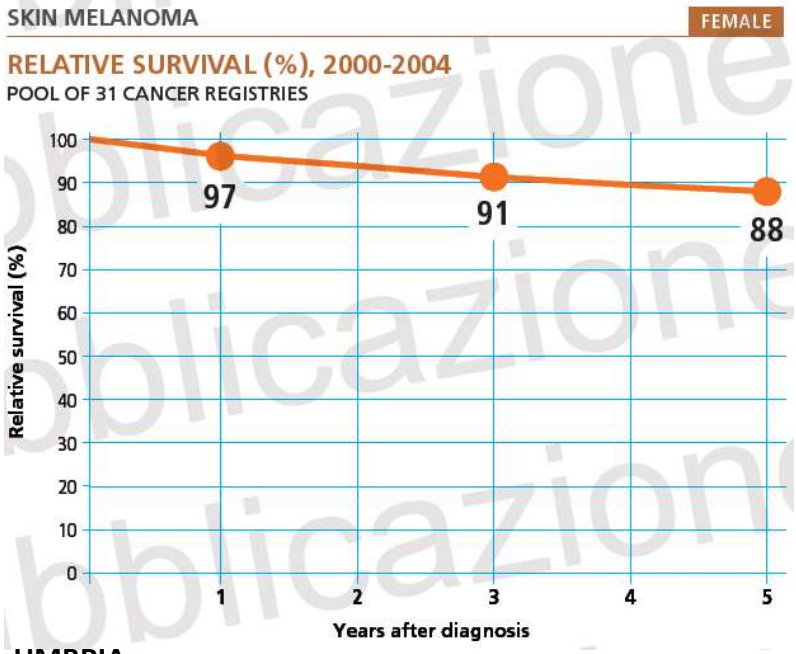


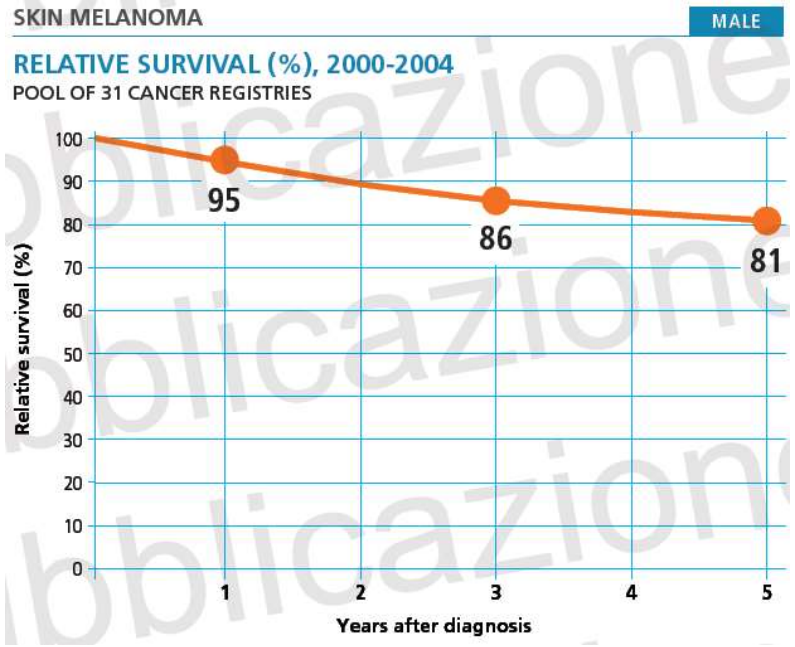


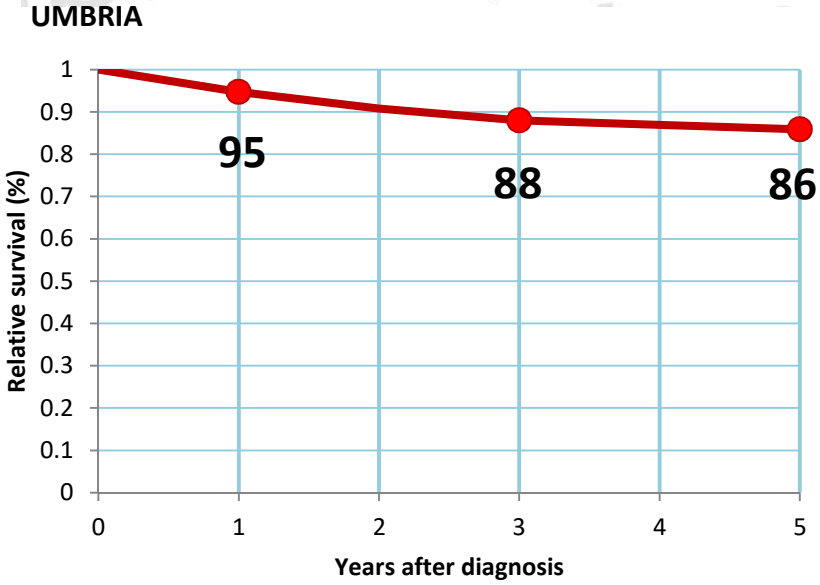


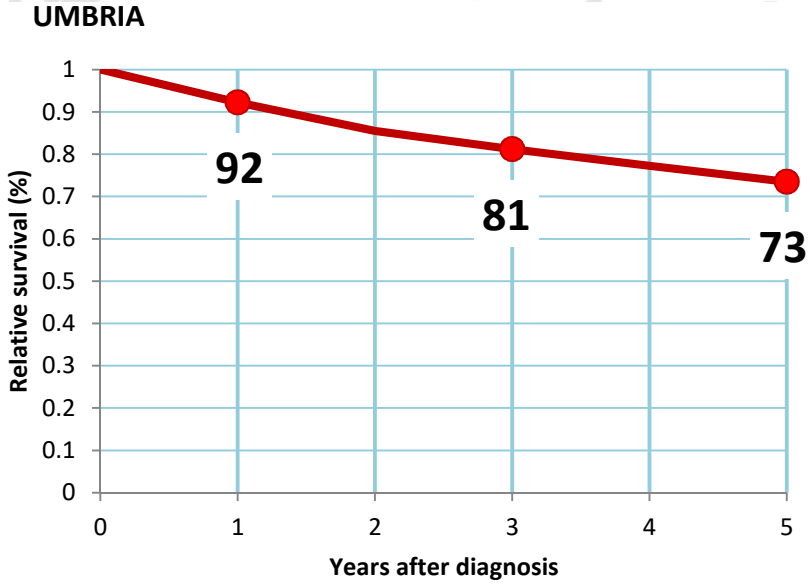


Sopravvivenza relativa per area geografica

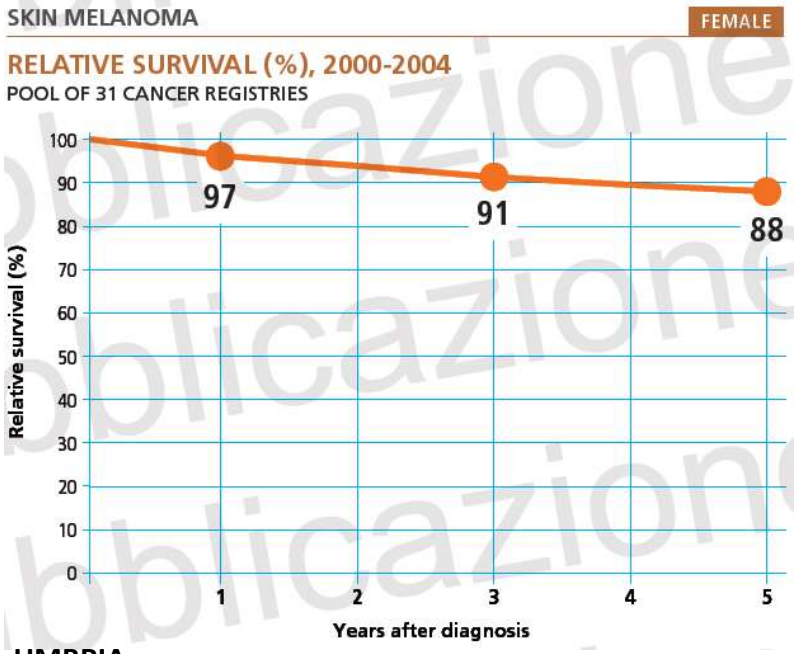


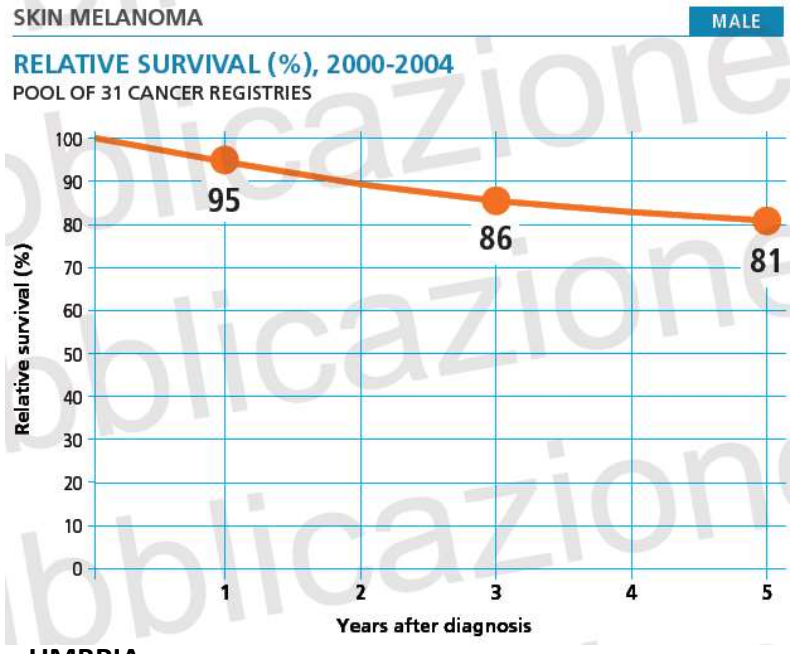


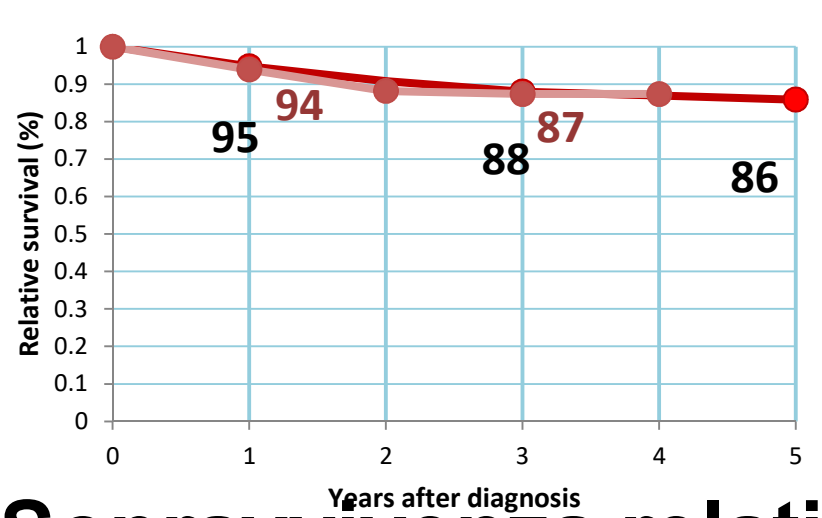


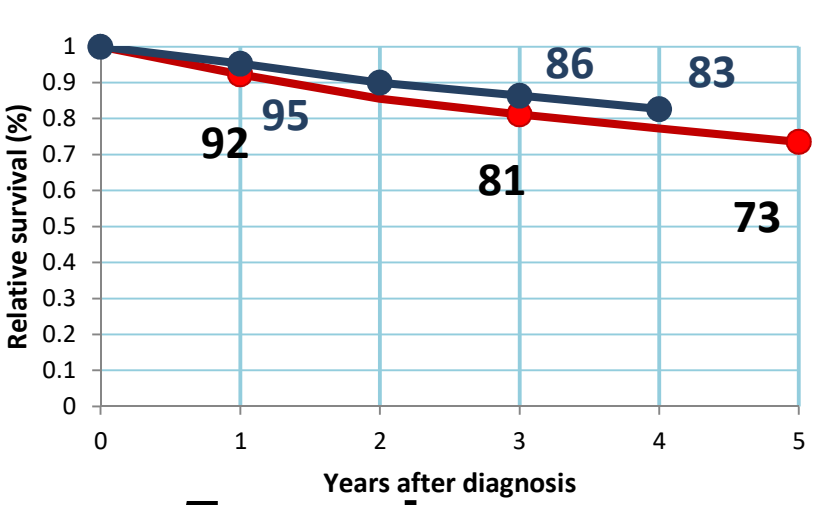


Sopravvivenza relativa a 5 anni per sesso e area – periodo 2000-2004

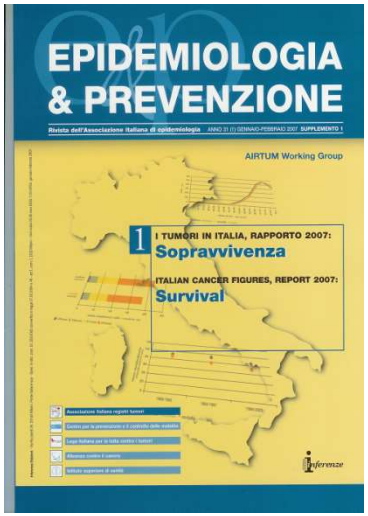






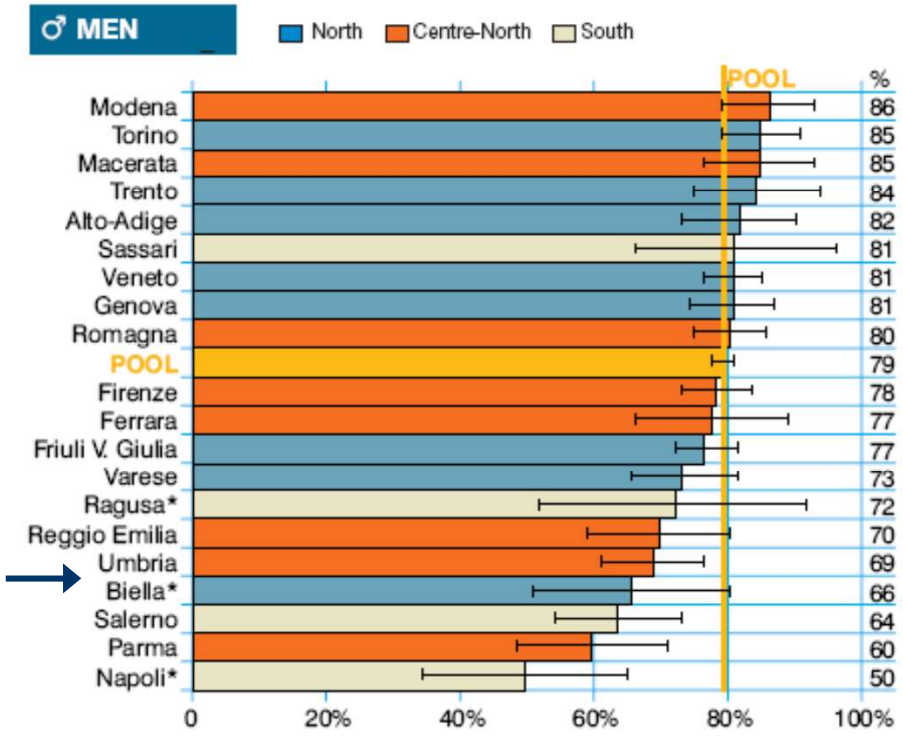


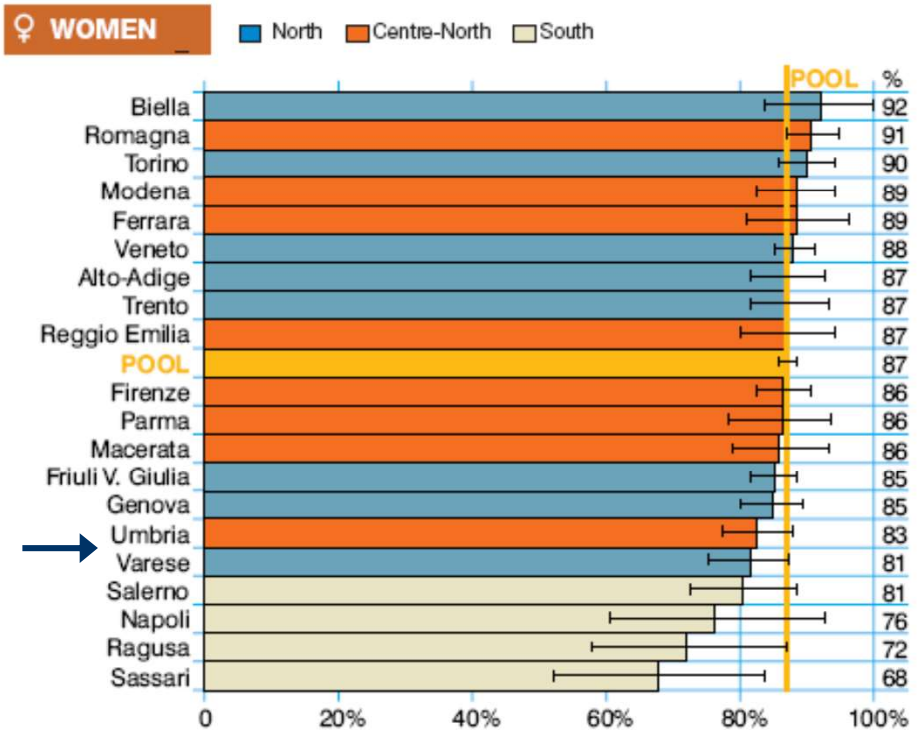
Sopravvivenza relativa a 5 anni per sesso e area – periodo 2000-2004 e (Umbria) 2005-2008



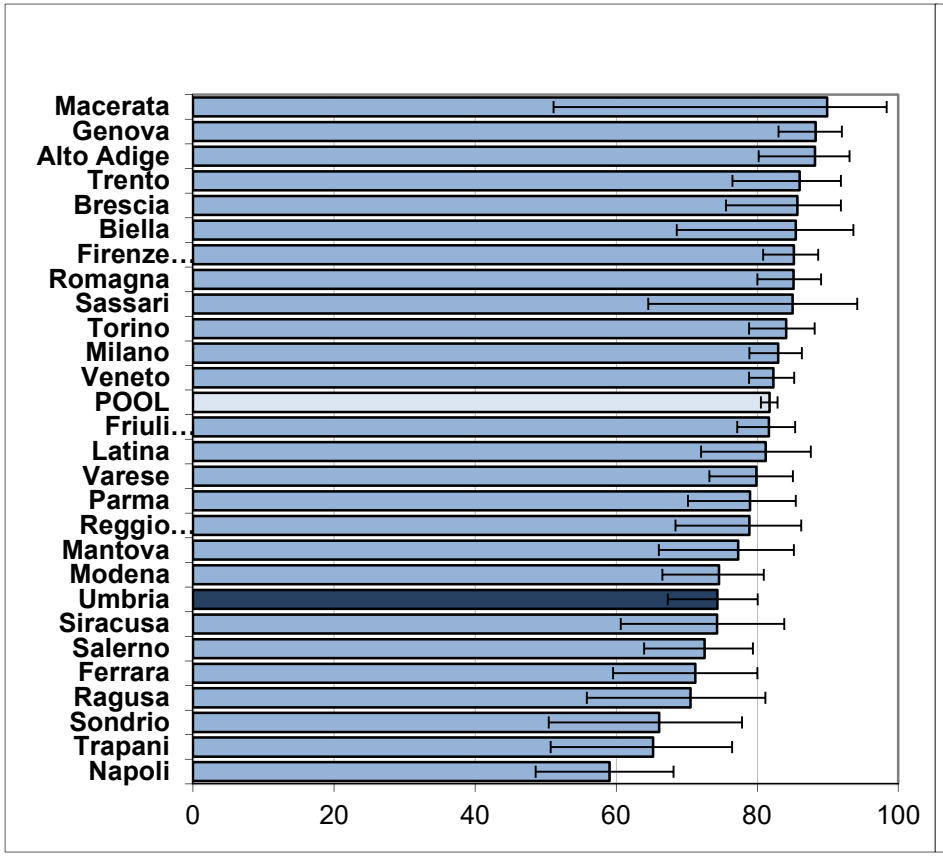
Sopravvivenza nei registri italiani 1995-1999

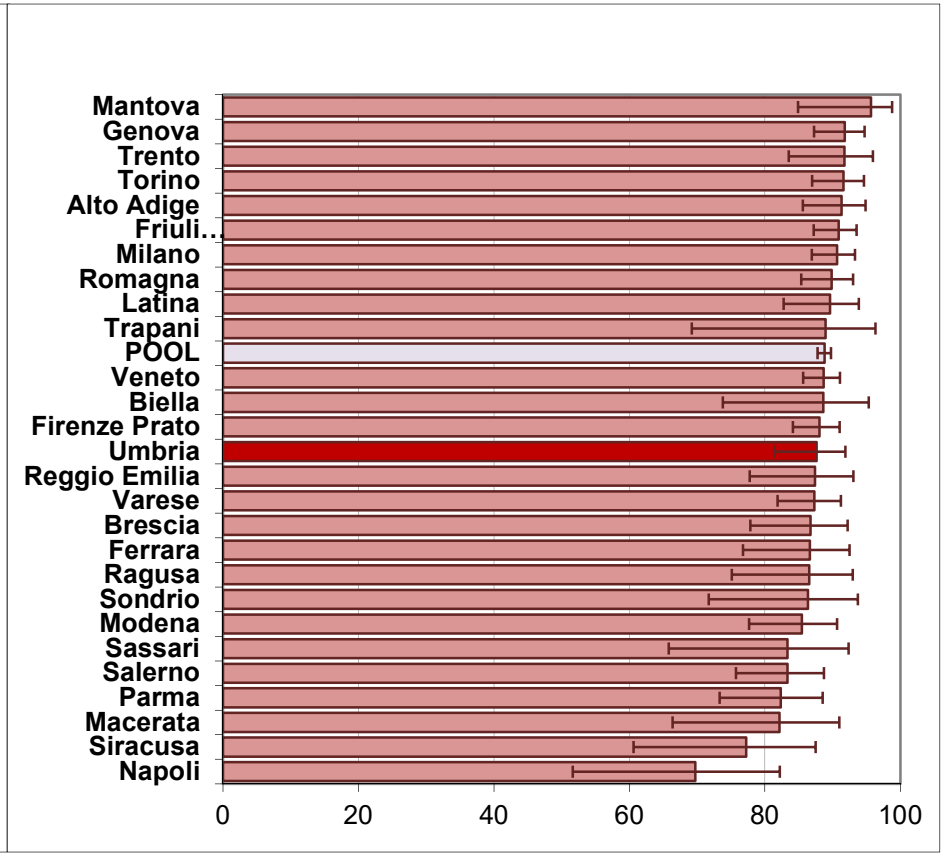
Five-year age-standardised relative survival



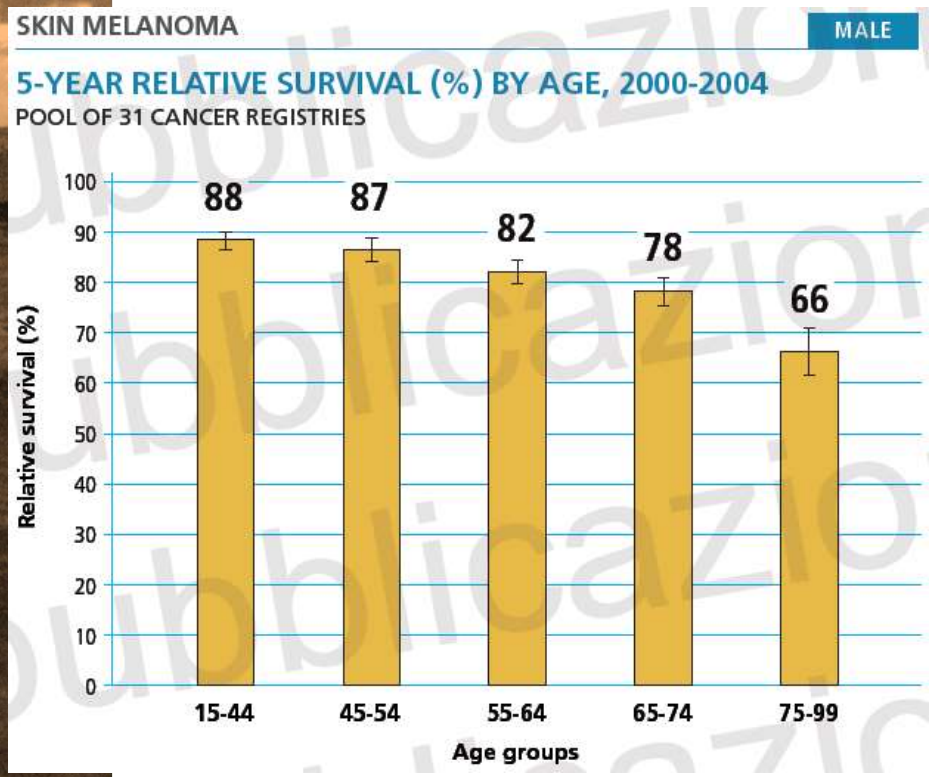


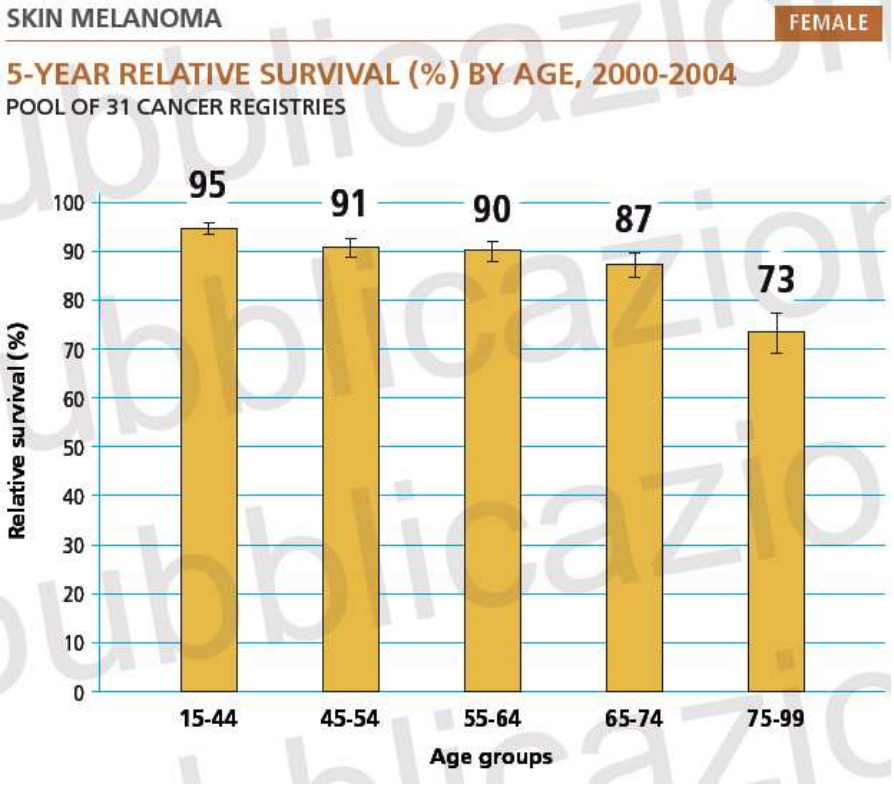
Sopravvivenza nei registri italiani 2000-2004 *(imminente)*



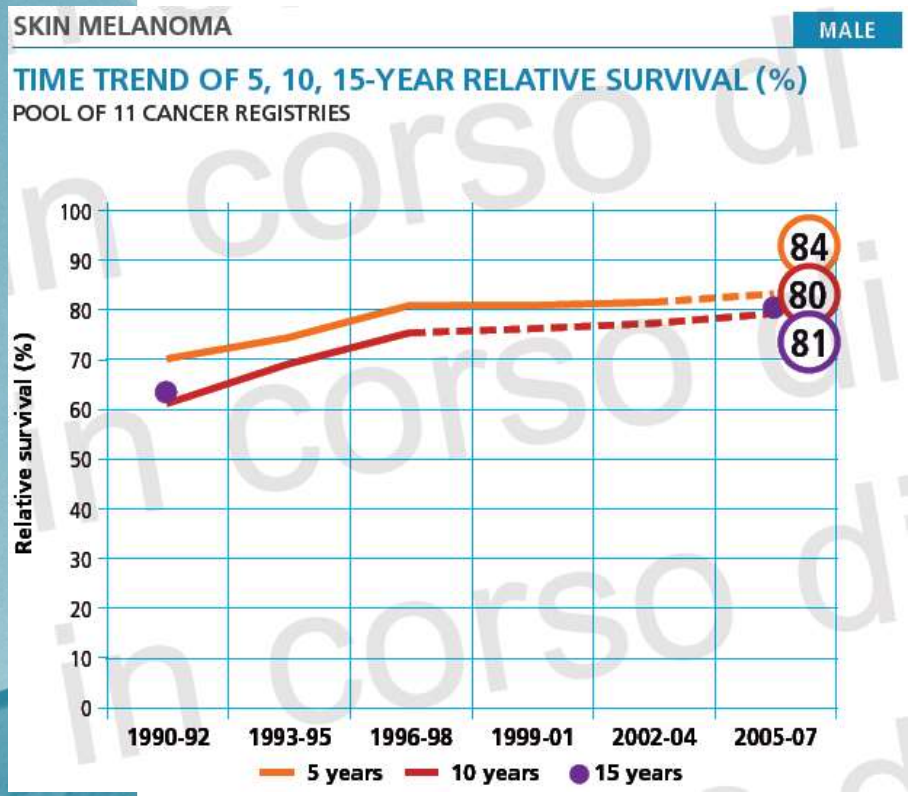


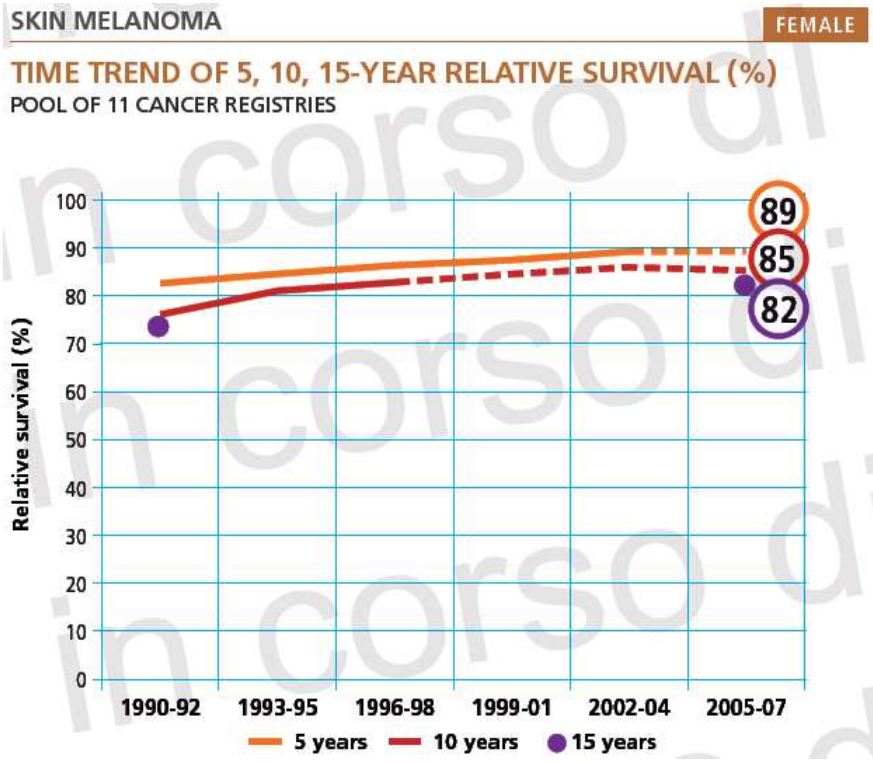
Sopravvivenza relativa per classe d'età



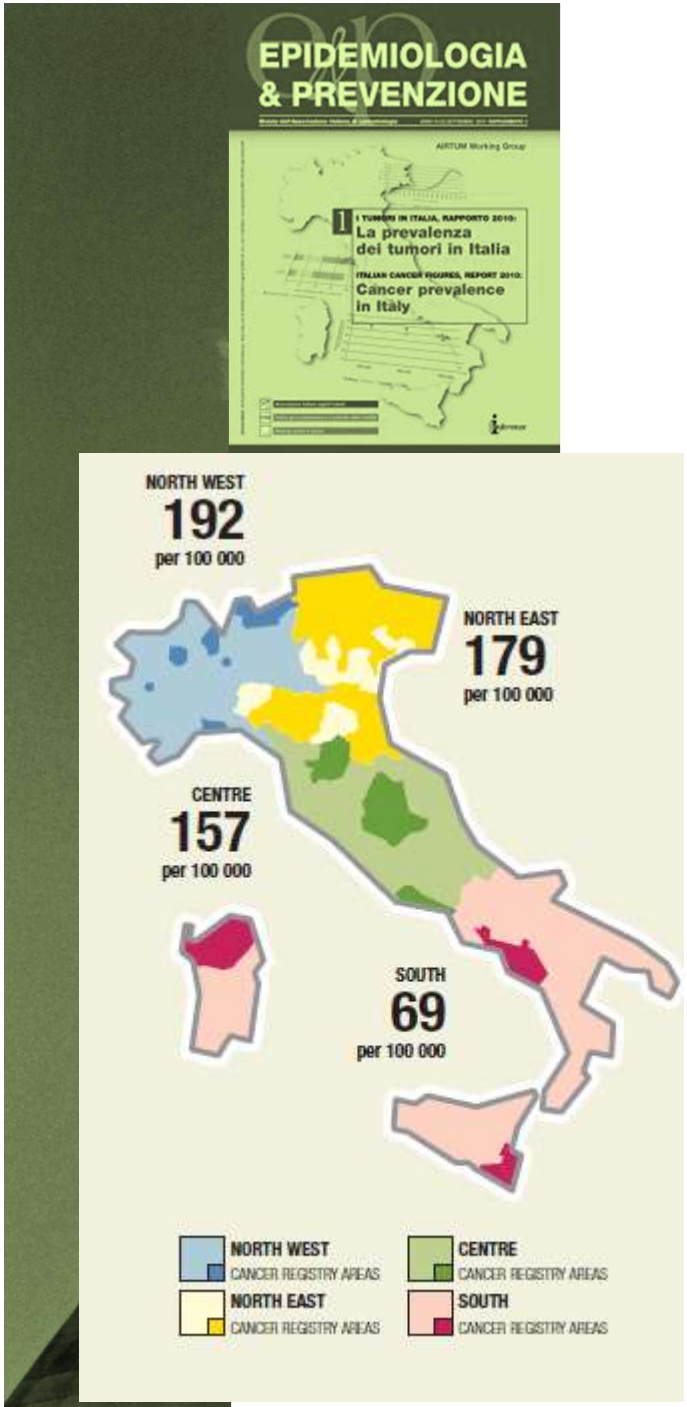


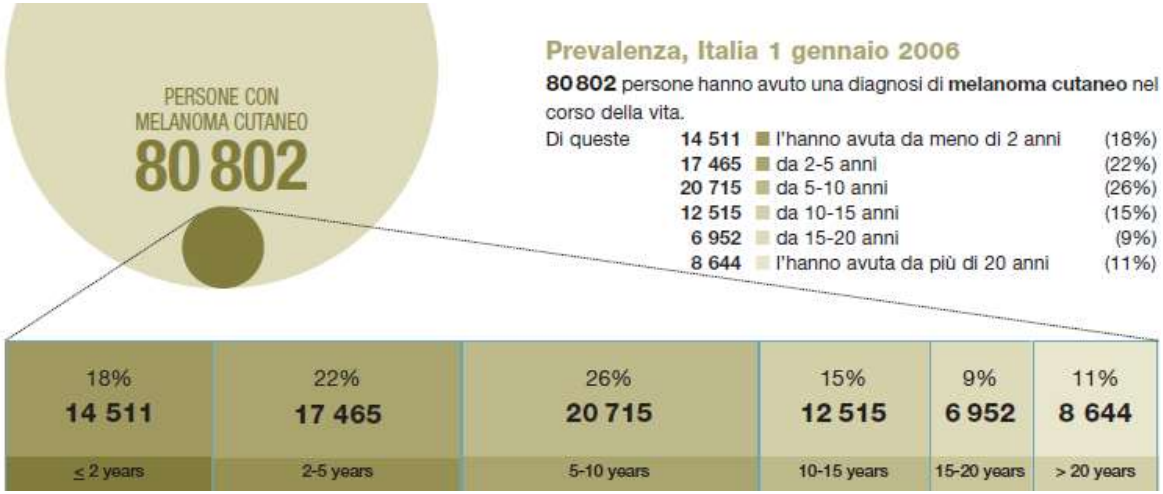
Trend della sopravvivenza



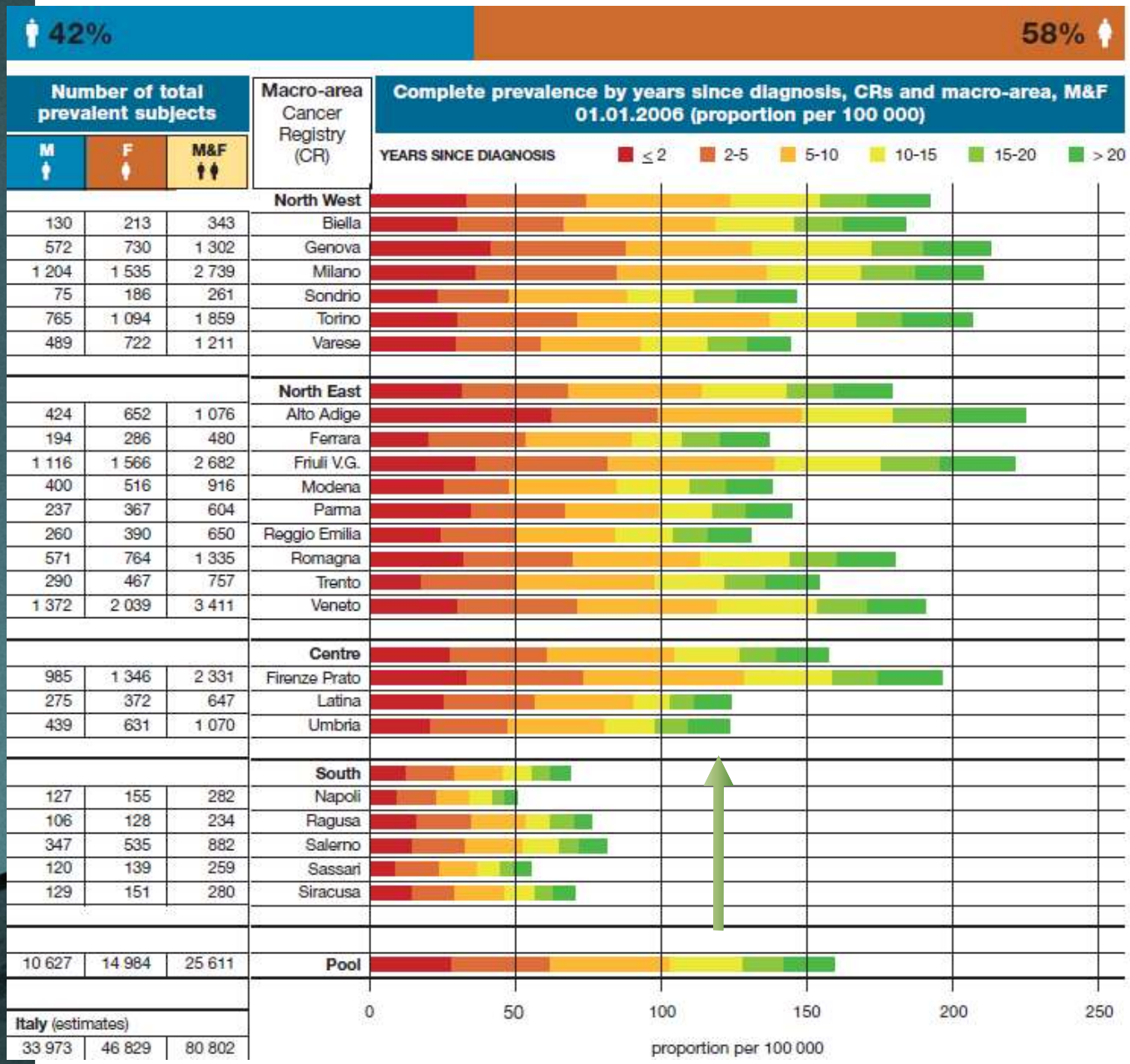


Prevalenza per area geografica (sinistra) e per durata di malattia (destra)





Prevalenza per registro



Centro-su

Conclusioni

- Il melanoma non è uno dei tumori più frequenti in Umbria
- ma presenta un quadro epidemiologico sfavorevole
- La mortalità è in aumento in entrambi i sessi
- L'incidenza subisce un andamento coerente con la mortalità
- Un'aumentata esposizione a fattori di rischio sembra la migliore spiegazione dei dati
- I dati di sopravvivenza non possono essere letti direttamente in termini di qualità del trattamento ma verosimilmente rispecchiano una scarsa intensità delle attività di diagnosi precoce

Interventi per il controllo del melanoma

- Prevenzione primaria: controllo dell'esposizione
  - Esposizione voluttuaria e professionale
    - Età
    - Bruciature solari
- Diagnosi precoce
  - Autoesame e mappa dei nevi
  - Esame specialistico
    - Ispezione e mappa dei nevi
    - Dermoscopia

UV

- The primary carcinogen for the genesis of skin cancers is ultraviolet light from solar radiation and tanning beds.
- [Indoor tanning/artificial sunlamps. *Indoor tanning is believed to be the major contributor to the increasing incidence of cutaneous melanoma among young women*]
- In spite of massive health campaigns to raise public awareness on ultraviolet radiation, sun-protective practices still fall behind. A plausible explanation is the lack of behavioral change in the populations at risk

Creme solari

- Broad spectrum UVB and UVA protection and regular application in sufficient amounts are essential for prevention of skin cancers, UV-induced immunosuppression, and skin aging.
- Sunscreens have become since more than 40 years the most popular means of protection against UV radiation (UVR) in Western countries
- A significant benefit from regular sunscreen use has not yet been demonstrated for primary prevention of basal cell carcinoma and melanoma. Concerning the prevention of actinic keratoses, squamous cell carcinomas, and skin aging, the effect of sunscreens is significant, but it remains incomplete.

Bens G. Sunscreens. Adv Exp Med Biol. 2014;810:429-63.

Screening and Prevention Measures for Melanoma: Is There a Survival Advantage? Curiel-Lewandrowski C et al. Curr Oncol Rep (2012) 14:458–467

- Those questioning the benefits of prevention efforts base their arguments on the absence of prospective, randomized studies demonstrating decreased melanoma mortality to justify the cost associated with screening and educational campaigns.
- In 2009, the US Preventive Services Task Force (USPSTF)report did not recommend routine primary care screening for the general population given the absence of evidence.

Screening di popolazione ed evidenza

The largest systematic population-based skin cancer screening program in the world (SCREEN) was initiated in the northern Germany state of Schleswig-Holstein, in which statewide screening of citizens ≥20 years was conducted from July 2003 to June 2004. Screening physicians (both dermatologists and non-dermatologists) were trained and performed dual screens (initial general practitioner WBSE followed by dermatologist referral for suspicious skin findings).

Does Skin Cancer Screening Save Lives? An Observational Study... Katalinic A. Cancer 2012;118:5395-402.

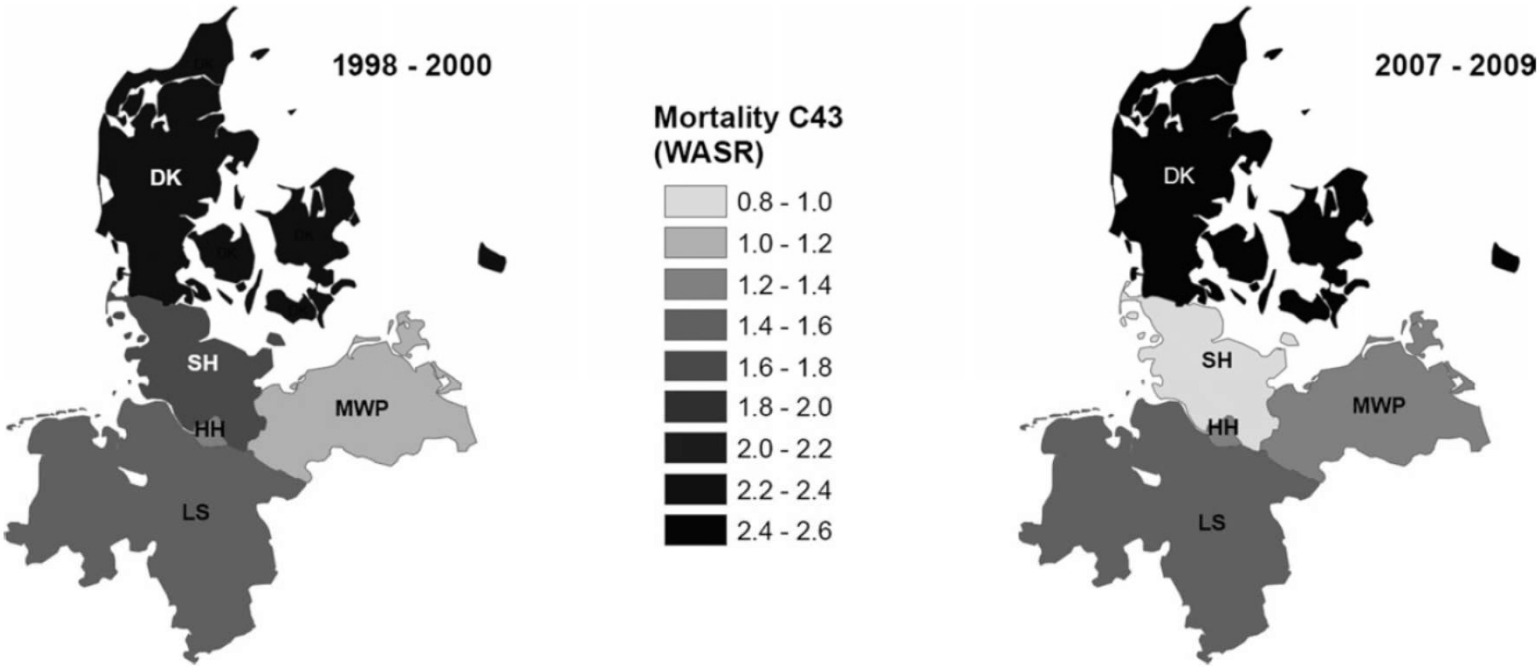


Figure 1. Observed melanoma mortality is illustrated in the screening area (Schleswig-Holstein [SH]) and in the 4 adjoining regions (Denmark [DK], Mecklenburg-Vorpommern [MWP], Hamburg [HH], and Lower Saxony [LS]) as the age standardized rate (World population [WASR]) per 100,000. C43 indicates code C43 from the International Classification of Diseases, 10th edition.

The current data represent strong evidence, but not absolute proof, that the skin cancer screening program produced a reduction in melanoma mortality in Schleswig-Holstein.

Altre evidenze

Table I. Key studies and major findings

Authors (y)	No. of subjects	Time period	Premise	Major finding(s)	Screener (dermatologist or PCP)
Schneider et al[18] (2008)	Thousands	1984-1996	Employee screening program at the Lawrence Livermore National Laboratory in Northern California	69% reduction in thick melanoma (>0.75 mm); no melanoma mortality in the study workforce compared with 3.39 expected deaths (based on California mortality data; $P = .034$)	Dermatologist
Aitken et al[21] (2010)	7586	2000-2003	Population-based, case control study of Queensland, Australia residents (20-75 years of age) with histologically confirmed first primary invasive melanoma	14% lower risk of thick (>0.75 mm) melanoma diagnosis after a PSE within the previous 3 years (OR, 0.86 [95% CI, 0.75-0.98]); 26% fewer melanoma deaths in screened cases vs unscreened cases within 5 years	Both
Swetter et al[24] (2012)	566	May 2006-March 2009	Multi-institutional study of adults with invasive melanoma assessed the role of PSE in the year prior to diagnosis	Patients who had a full-body PSE (dermatologist or PCP) in the year before diagnosis >2 times as likely to have a thinner melanoma (OR, 2.51 [95% CI, 1.62-3.87]); men >60 years of age who had PSE 4 times as likely to have thinner melanoma (OR, 4.09 [95% CI, 1.88-8.89])	Both

Screening test

Recognition patterns

- The asymmetry, border, color, and diameter (ABCD) clinical warning signs for differentiating melanoma from benign moles were developed in the 1980s.
- Since then, an E (evolution) and other new approaches and techniques for earlier diagnosis have been added.
- The *ABCDE* signs of melanoma have been criticized for their inability to detect more rapidly growing melanomas, such as the nodular subtype.

Mayer JE et al. Screening, early detection, education, and trends for melanoma: Current status (2007-2013) and future directions. J Am Acad Dermatol. 2014; 599.e1-599.e12; 599.e1271:611.e1-611.e10

Screening test 2

- Dermatoscopy increases the sensitivity of clinical evaluation for melanoma and has been shown to decrease the number of excised benign lesions
- Total body photography may supplement dermatoscopic evaluation for early detection and aid in skin self-examination

Aggiornamento: **Mortality From Malignant Melanoma in an Era of Nationwide Skin Cancer Screening**

- Nationwide skin cancer screening has been offered in Germany since 2008. On the basis of experience from a 2003/2004 pilot project in Schleswig-Holstein, there had been expectations that national screening might lead to a substantial decrease in melanoma mortality within a few years
- However, the analysis of current melanoma mortality trends in Germany … shows that as yet there has been no such decrease.
- Quite the reverse was observed: in addition to the expected substantial increase in observed melanoma incidence, melanoma mortality has actually risen slightly

Brenner H. Dtsch Arztebl Int 2015; 112: 627–8

Possibili spiegazioni: influenze collaterali allo screening

- only 10% of men and 27% of women had made use of the screening offer in 2003/2004
- increased awareness of examination for skin cancer among patients and physicians, and increased detection of skin cancer even outside screening examinations
- During the pilot project, however, the incidence of melanoma, an indicator of the intensity of screening, rose only slightly

Chance

- The very sizeable decrease in melanoma mortality during the pilot project may also have been partly due to chance.
- Between 1998 and 2009 the annual number of malignant melanoma deaths in Schleswig-Holstein ranged between 21 and 52 in women and between 23 and 57 in men.
- The figure varied widely from year to year,
- Nevertheless, the estimated annual decrease, 7.5%, had only borderline statistical significance. With a 95% confidence interval of 0.5% to 14%,
- In women, however, the decrease was statistically unambiguous despite the small case numbers

Does Skin Cancer Screening Save Lives? A Detailed Analysis of Mortality Time Trends in Schleswig-Holstein and Germany

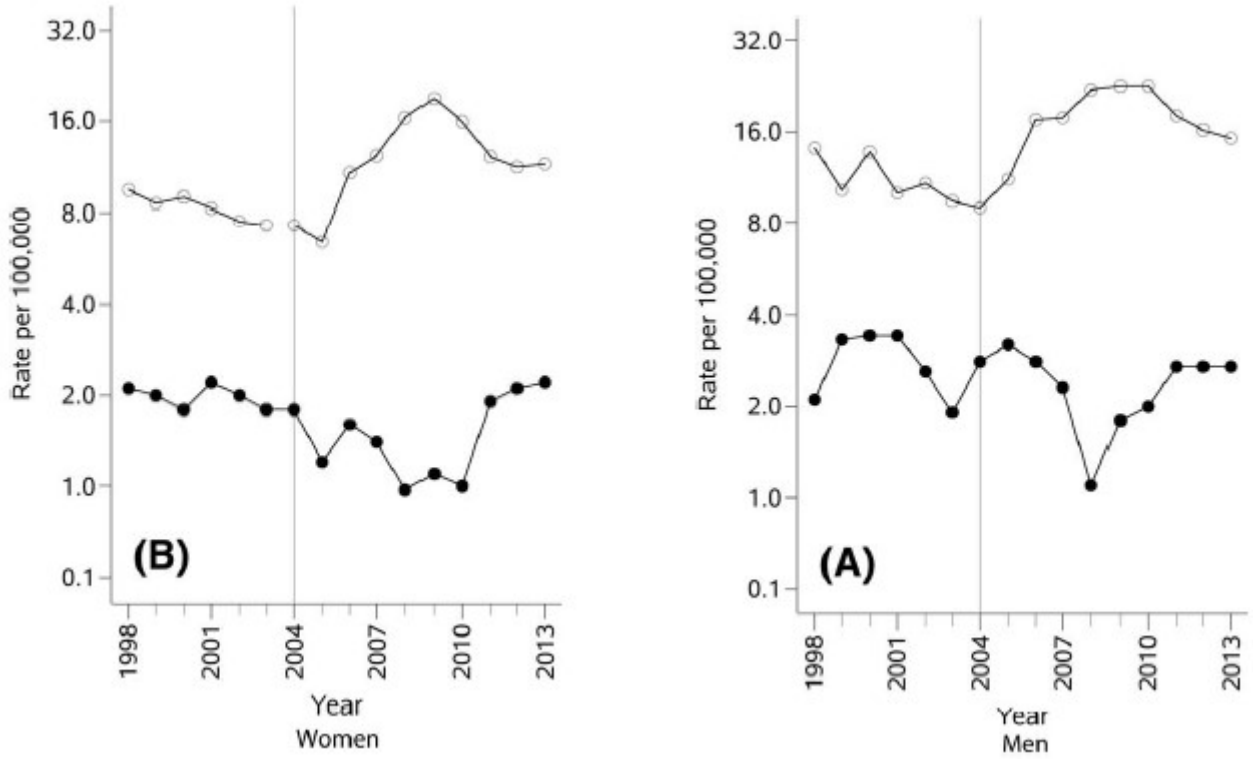


Figure 1. Age-standardized mortality rates per 100,000 person-years for skin melanoma (in Schleswig-Holstein, Germany, from 1998 through 2013 for (Top) men and (Bottom) women. Dots indicate skin melanoma mortality, circles, mortality due to malignant neoplasms of ill-defined, secondary, and unspecified sites; vertical line, the year 2004 to mark the period of the SCREEN project (July 2003-June 2004).

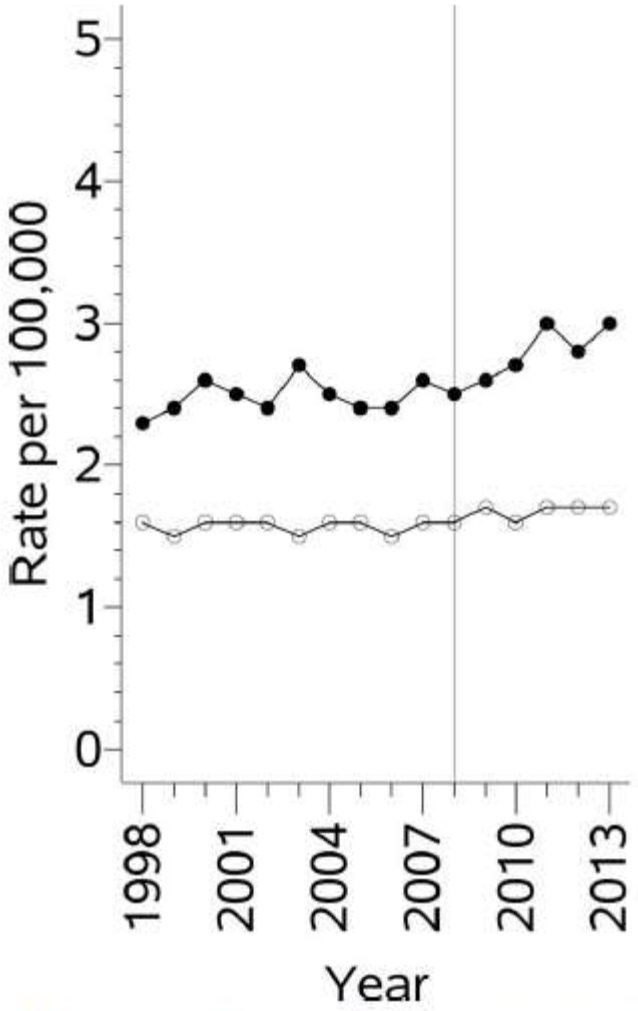
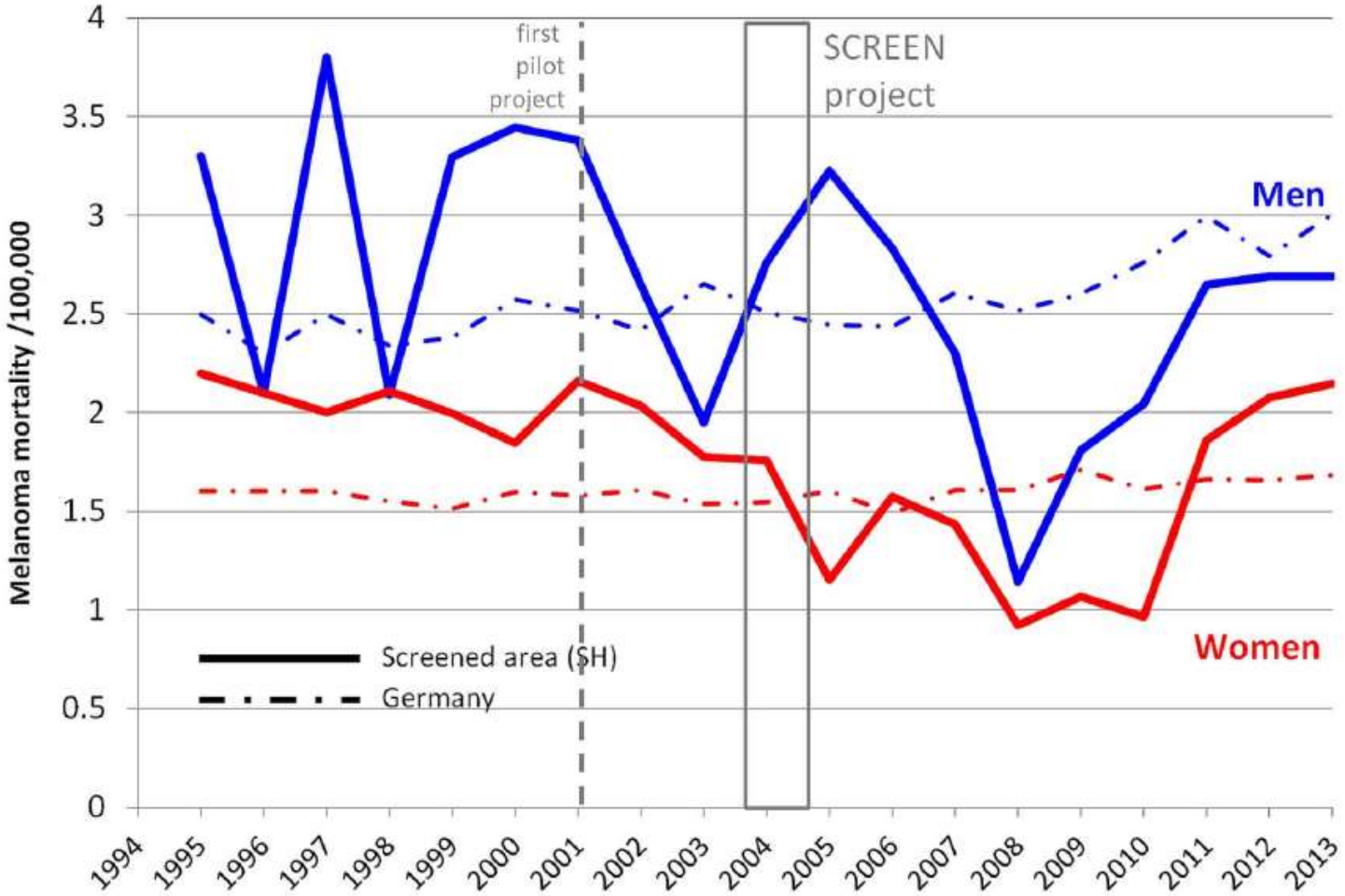


Figure 2. Age-standardized mortality rates for skin melanoma (*10th Revision of the International Statistical Classification of Diseases and Related Health Problems* [ICD-10] code C43) per 100,000 person-years by sex in Germany, 1998 through 2013. Dots indicate males; circles, females; vertical line, the initiation of the nationwide skin cancer screening program in Germany; age standard: European Standard population.

Screening in Germany

- As the total population of Germany (approximately 82 million), …is almost 30 times larger than that of Schleswig-Holstein (approximately 2.8 million),
- chance variations obviously play a much smaller role here.
- The **data now available raise the question of whether the current skin cancer screening program achieves any significant benefit at all**

Trend in cutaneous melanoma mortality in the screened area Schleswig– Holstein (SH) as compared with the whole of Germany



Melanoma mortality following skin cancer screening in Germany. Boniol M BMJ Open 2015

However

- However, the current unique situation in Germany **represents a quasi-experimental setting in Europe to evaluate** whether such a massive introduction of total body skin examination in the general population is **effective** in decreasing melanoma mortality.

Melanoma mortality following skin cancer screening in Germany. Boniol M BMJ Open 2015

Effetti dello screening

- This is a pressing question, not least because the annual direct cost of screening is more than €130 million (3) and
- melanoma incidence rates were roughly 30% higher after screening had been introduced.
- …Independent scientific evaluation must finally become the general standard when new screening programs are launched
- … Such discussion should not unduly cast doubt on highly effective cancer screening programs such as those for cervical cancer (6) and bowel cancer (7–9).

Crocetti E, et al. Strong seasonality in the diagnosis of skin melanoma in Italy: the Italian Network of Cancer Registries (AIRTUM) study. Tumori. 2009;95:665-8.

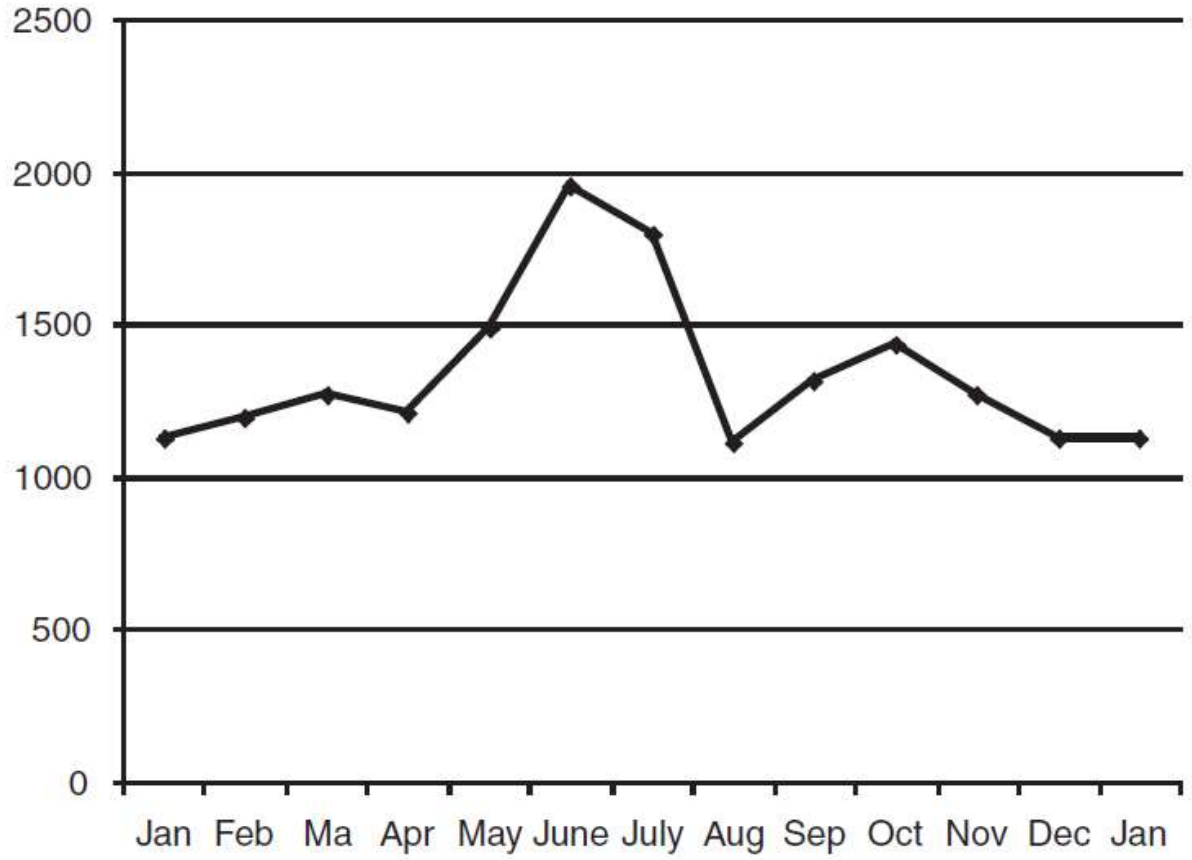
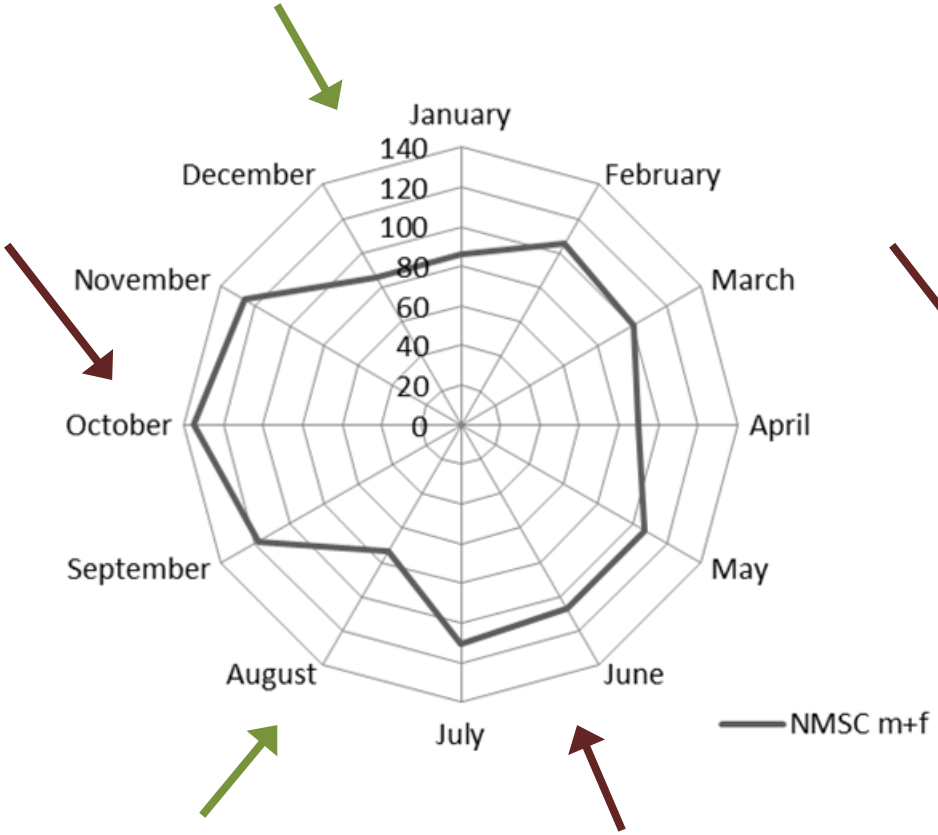
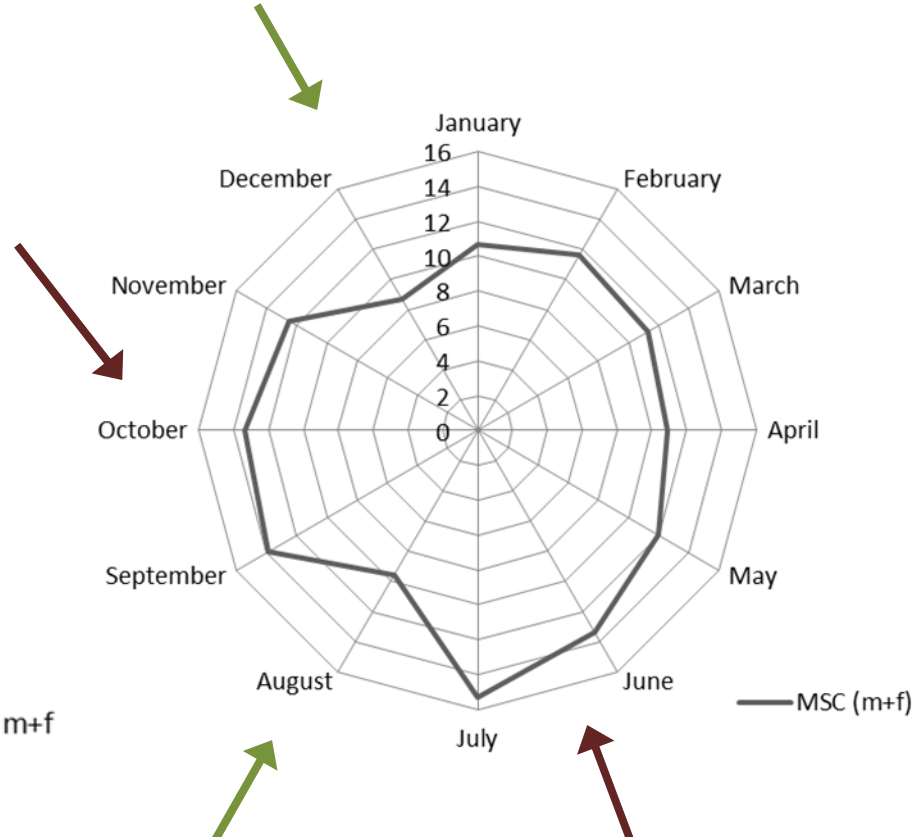
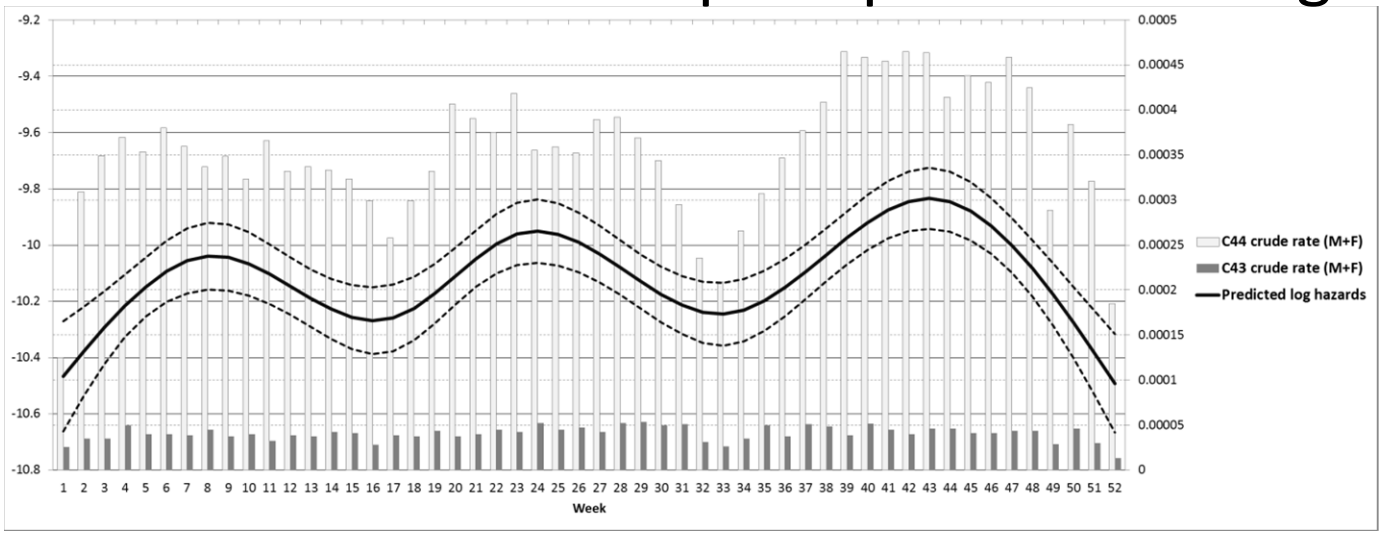


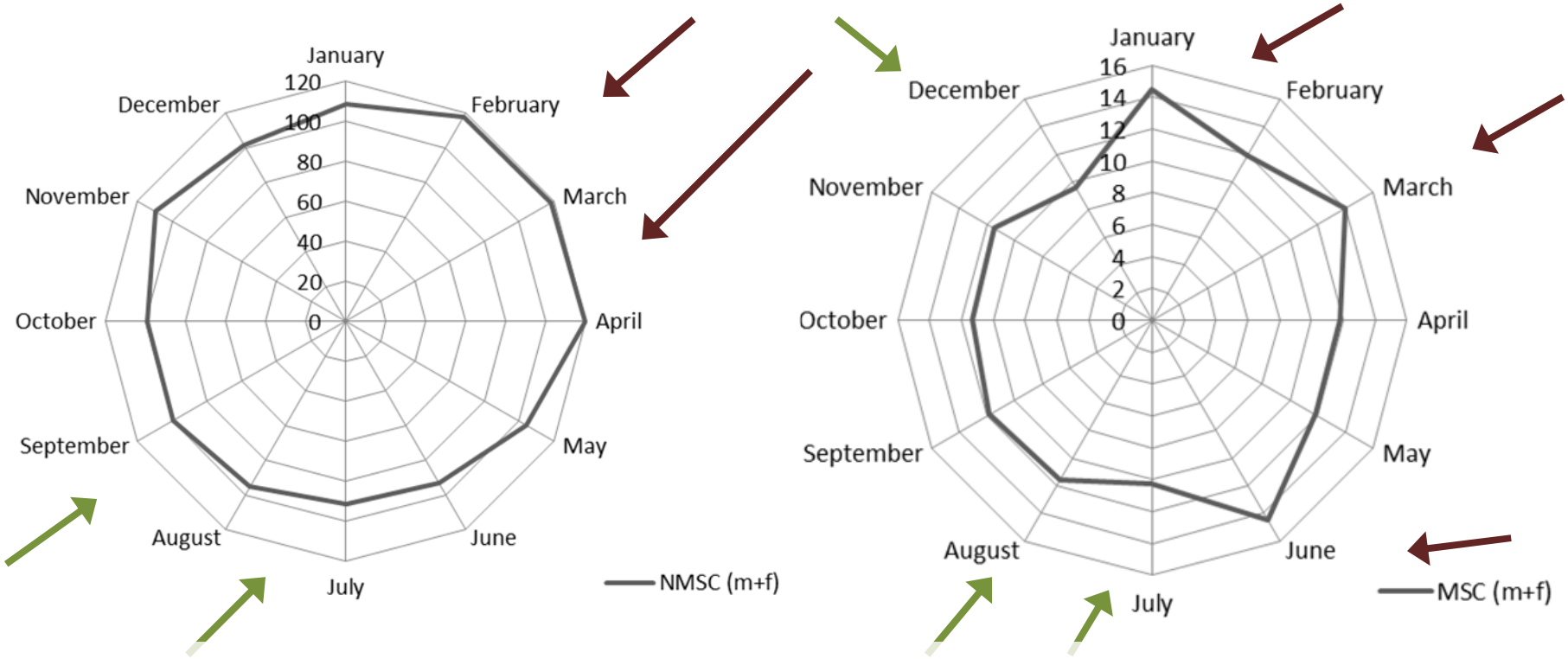
Figure 1 - Italian network of cancer registries (AIRTUM). Skin melanoma: Number of melanoma diagnosis according to the month of diagnosis, 1978-2002.



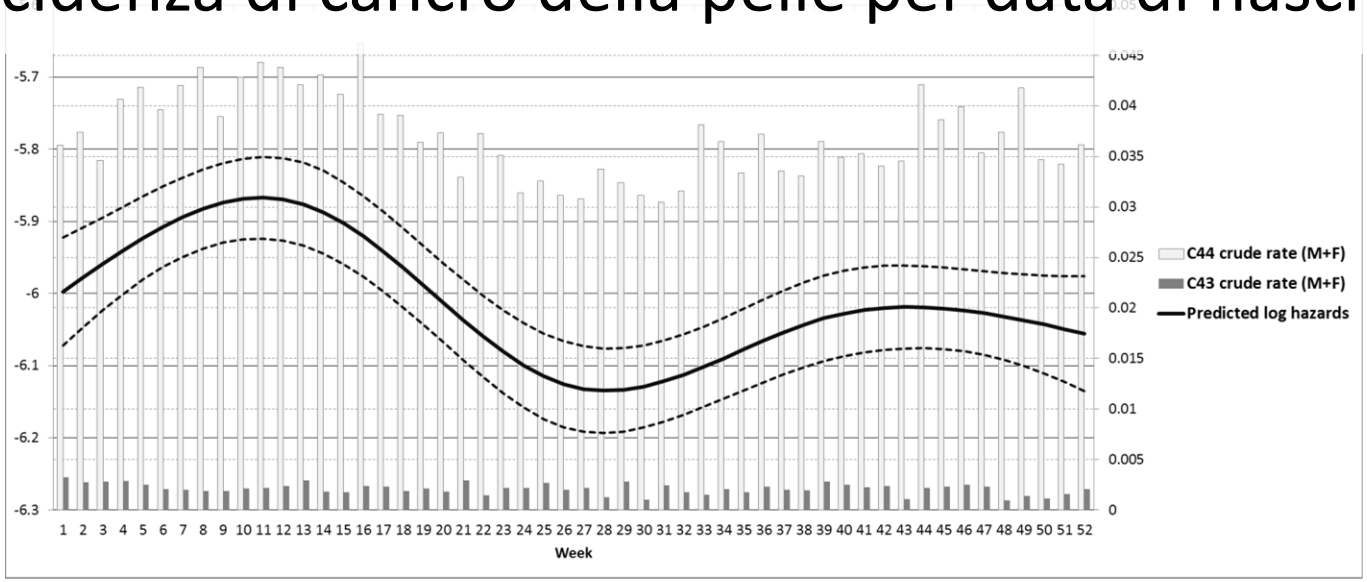


Incidenza di cancro della pelle per data di diagnosi

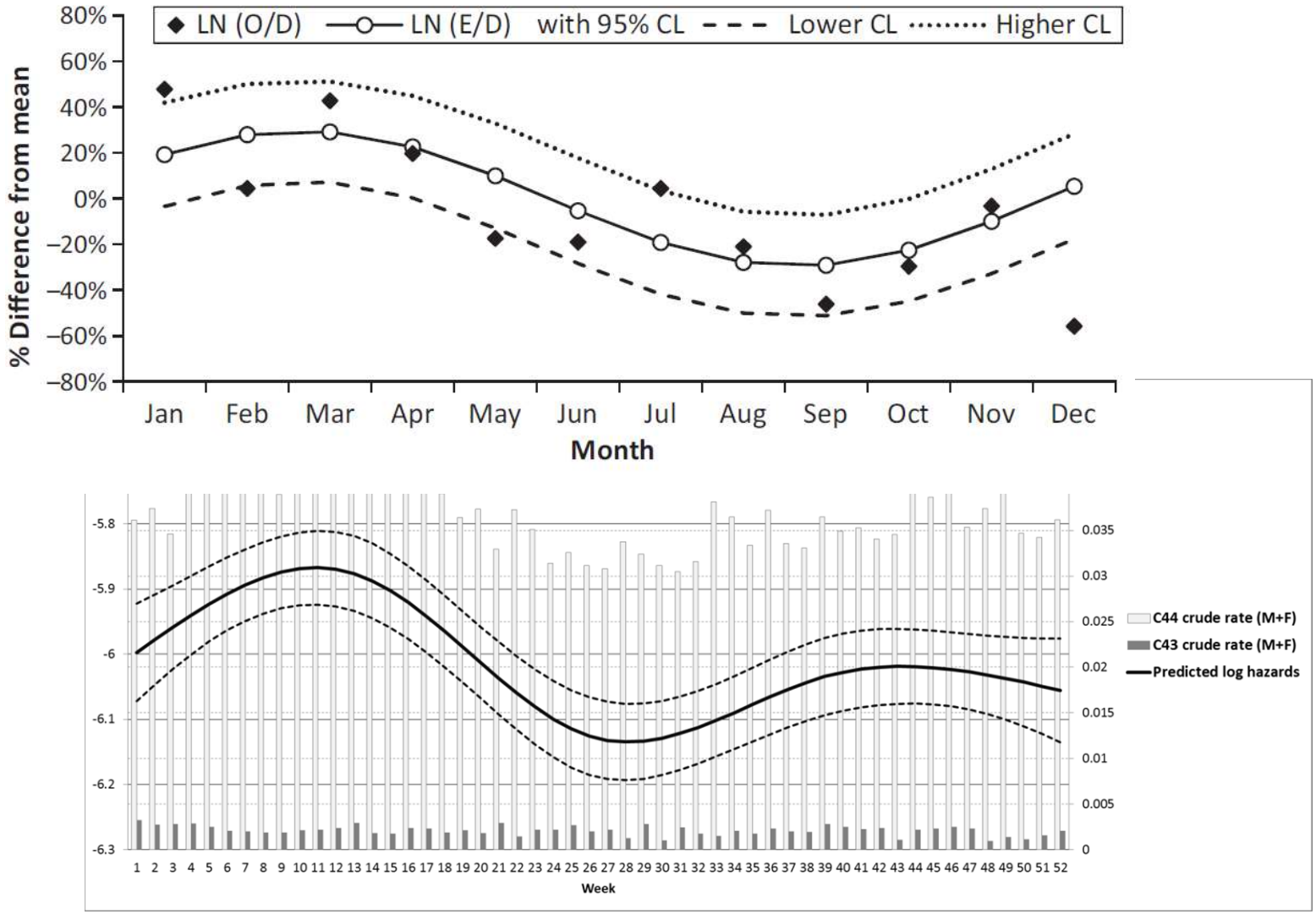




Incidenza di cancro della pelle per data di nascita



Basta NO, James PW, Craft AW, McNally RJ. Seasonal variation in the month of birth in teenagers and young adults with melanoma suggests the involvement of early-life UV exposure. Pigment Cell Melanoma Res. 2011;24:250-3.



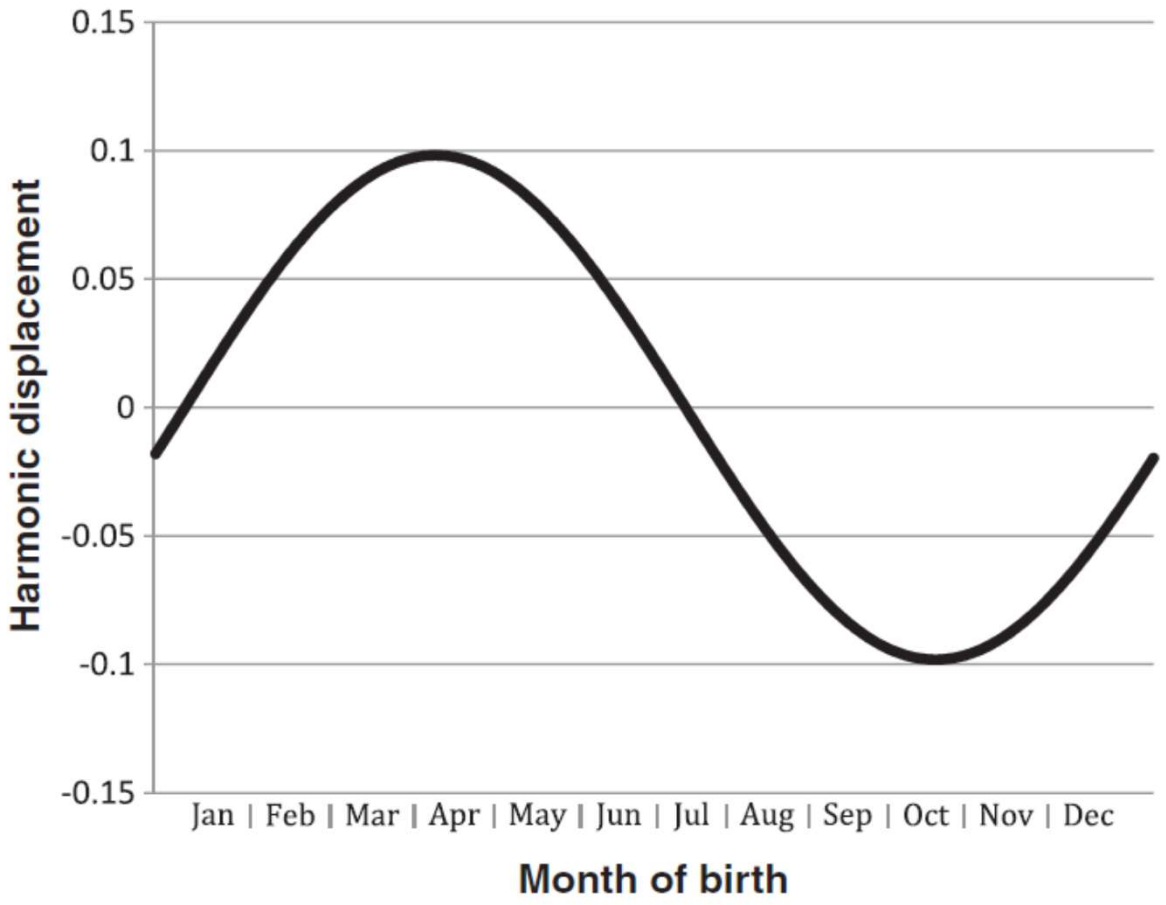


Figure 1. Sinusoidal logistic regression results for association between birth date and cutaneous malignant melanoma in childhood through young adulthood, adjusted for birth year ($P = 0.006$ for overall seasonal association). Harmonic displacement represents the log odds ratio for a given time point relative to the mean risk across the entire calendar year.

Methods: National **cohort study** of 3 571 574 persons born in Sweden in 1973–2008

Crump C, et al. Season of birth and other perinatal risk factors for melanoma. Int J Epidemiol. 2014;43:793-801.

Table 1. Negative binomial regression models for NMSC and MSC cancers by month of birth

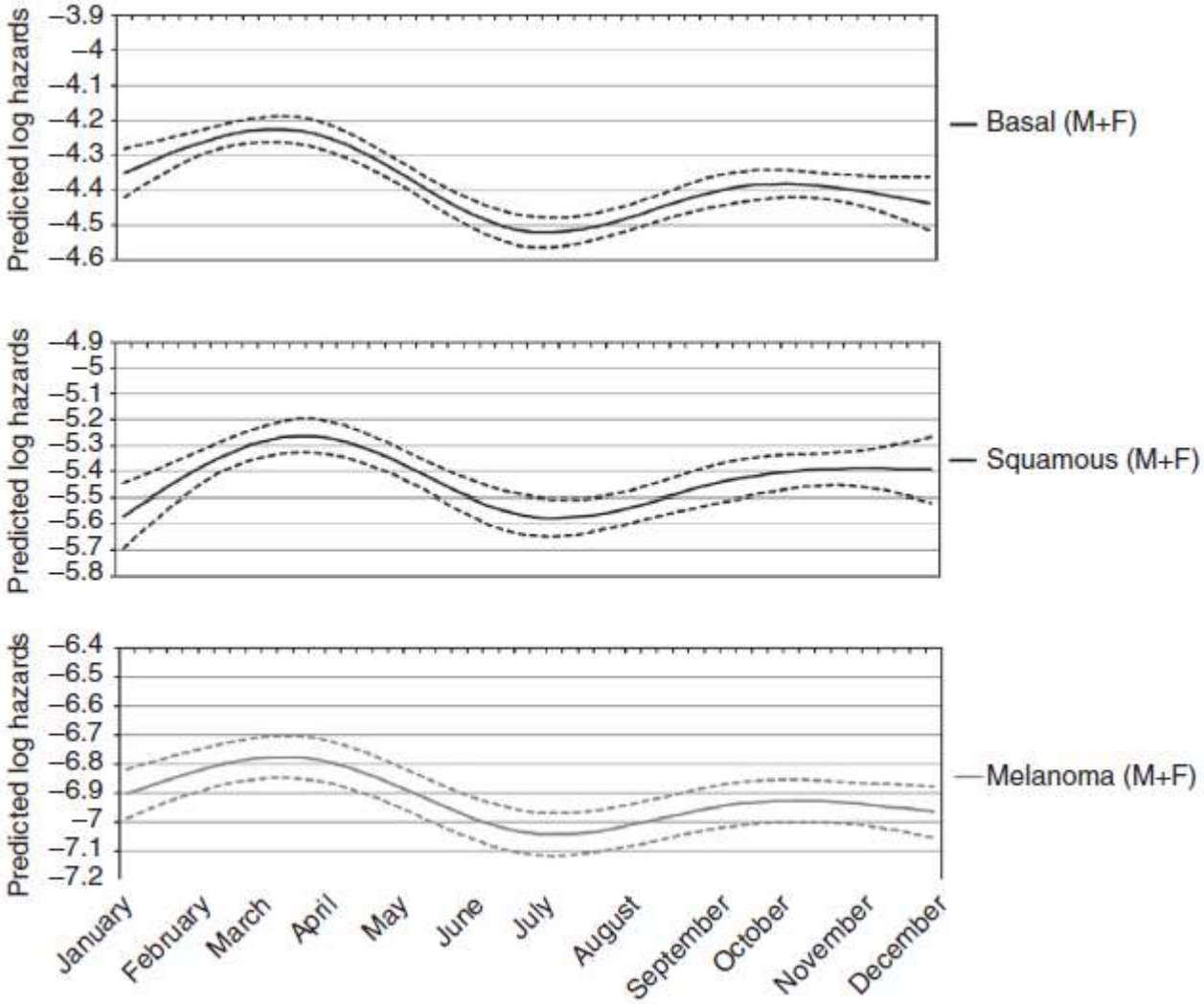
	NMSC (C44)				MSC (C43)			
Variable	**IRR**	**95% CI**		***P***	**IRR**	**95% CI**		***P***
Months								
January	1.18	1.09	1.28	<0.001	1.41	1.12	1.77	0.003
February	1.29	1.19	1.39	<0.001	1.15	0.90	1.47	0.25
March	1.30	1.20	1.40	<0.001	1.36	1.09	1.71	0.007
April	1.31	1.21	1.41	<0.001	1.15	0.90	1.45	0.26
May	1.14	1.05	1.23	0.002	1.15	0.90	1.46	0.26
June	1.02	0.93	1.11	0.70	1.41	1.11	1.77	0.004
July[a]	Ref.				Ref.			
August	1.04	0.96	1.13	0.32	1.12	0.88	1.43	0.36
September	1.09	1.00	1.18	0.04	1.14	0.90	1.46	0.28
October	1.08	1.00	1.17	0.06	1.10	0.86	1.40	0.45
November	1.20	1.11	1.31	<0.001	1.12	0.87	1.43	0.37
December	1.11	1.02	1.21	0.01	0.93	0.72	1.21	0.61
Gender								
Males	Ref.				Ref.			
Females	0.66	0.64	0.68	<0.001	0.95	0.86	1.04	0.25

Abbreviations: CI = confidence interval; IRR = incidence rate ratio; MSC = melanoma skin cancer; NMSC = non-melanoma skin cancer; Ref. = reference category.

[a]reference category is the month with the lowest date of birth.

Rischio per periodo di nascita e morfologia

- Diversi tumori cutanei sono stati associati a modalità di esposizione differenti
- Le curve sono simili per cui i. il periodo di nascita è legato ad una suscettibilità ai tumori cutanei modulata dalle esposizioni ii. il rischio riflette l'azione di confondenti



Indicatori

Bilimoria KY, Raval MV, Bentrem DJ, Wayne JD, Balch CM, Ko CY.

National assessment of melanoma care using formally developed quality indicators.

J Clin Oncol. 2009;27:5445-51. Epub 2009 Oct 13

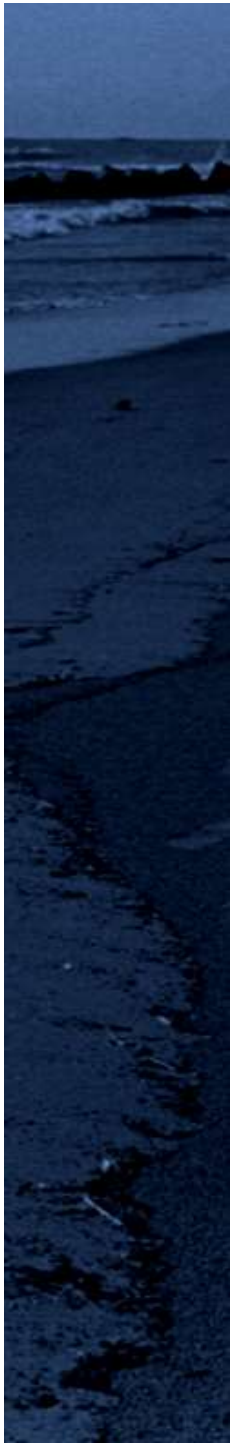
Methods

Quality indicators were identified from available literature, consensus guidelines, and melanoma experts. Thirteen experts ranked potential measures for validity on the basis of the RAND/University of California, Los Angeles Appropriateness Methodology. Adherence with individual valid indicators and a composite measure of all indicators were assessed at 1,249 Commission on Cancer hospitals by using the National Cancer Data Base (NCDB; 2004 through 2005).

Tipo di indicatori

Table 1. Summary of Indicators

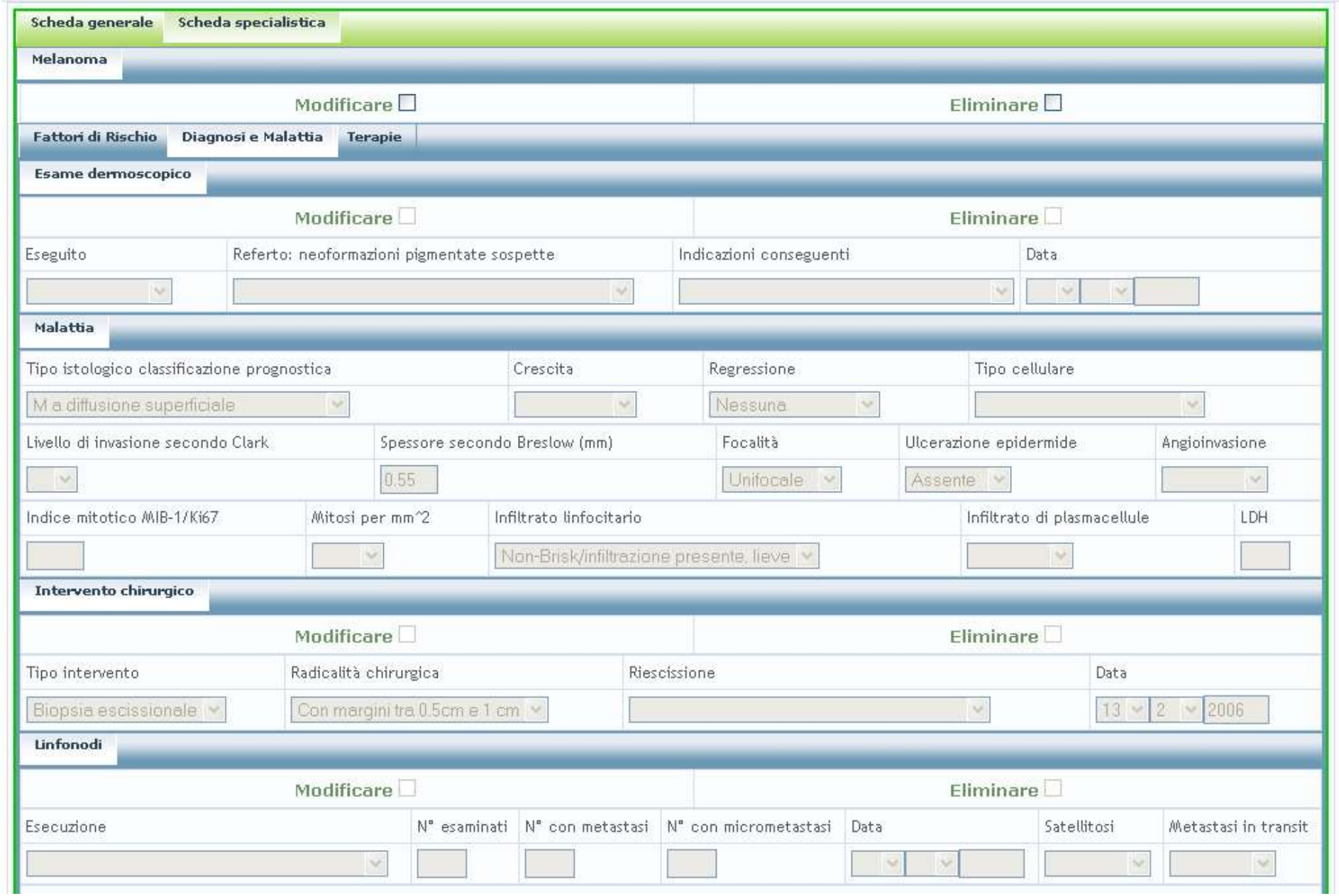
Variable	Indicators		
	All	Valid	Not Valid
No. of indicators	55	26	29
Domain			
Structure	7	1	6
Process	44	24	20
Efficiency	1	0	0
Outcome	3	1	2
Level of measurement			
Hospital/provider	9	1	8
Patient	46	25	21
Potential data source			
Cancer registry	14	10	4
Administrative data set	7	2	5
Patient chart only	31	13	18



Informazioni per il calcolo degli indicatori

- If a patient has a melanoma, then the pathology report must document (*Process*)
  - Breslow thickness,
  - Clark level,
  - histologic ulceration,
  - peripheral/radial and deep margin statuses,
  - satellitosis,
  - anatomic location of the lesion,
  - regression, and mitotic rate.

Una parte della scheda specialistica dedicata al melanoma

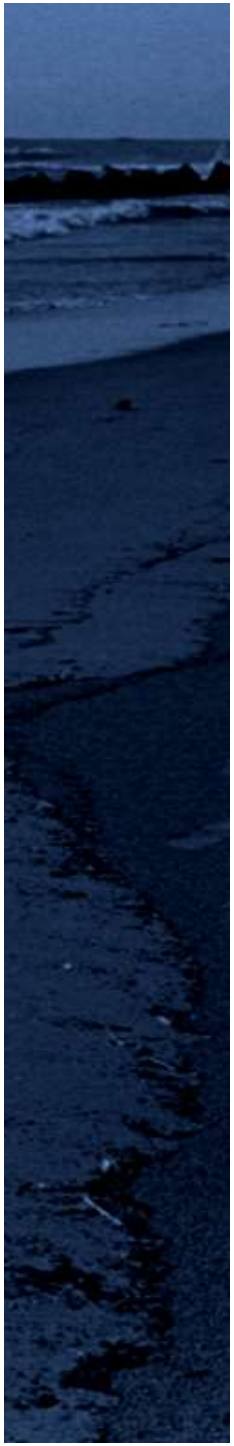


Spessore del melanoma

anno	n. casi	% mancanti	media
1994	71	**56.3**	2.76
1995	65	**46.2**	2.72
1996	69	**30.4**	2.03
1997	104	**36.5**	1.75
1998	91	**33.0**	2.08
1999	103	**30.1**	2.39
2000	93	**50.5**	2.09
2001	75	**48.0**	1.96
2002	132	**34.1**	2.09
2003	91	**29.7**	2.40
2004	82	**31.7**	1.47
2005	115	**20.9**	1.45
2006	118	**21.2**	2.38
2007	119	**34.5**	2.11

Spessore del melanoma

anno	n. casi	% mancanti	media
1994	71	**56.3**	2.76
1995	65	**46.2**	2.72
1996	69	**30.4**	2.03
1997	104	**36.5**	1.75
1998	91	**33**	2.08
1999	103	**30.1**	2.39
2000	93	**50.5**	2.09
2001	75	**48**	1.96
2002	132	**34.1**	2.09
2003	91	**29.7**	2.4
2004	77	**23.3**	1.73
2005	108	**13.89**	1.31
2006	124	**18.55**	1.94
2007	114	**12.28**	2.1
2008	125	**12**	1.8
2009	125	**14.4**	1.79
2010	125	**8.8**	1.64
2011	178	**13.48**	1.92
2012	162	**10.49**	1.49
2013	206	**9.22**	1.45
2014	231	**7.79**	1.45



Margini di resezione

1. If a patient has a **melanoma in situ** (ie, Tis), then the surgical excision margins must be **5 mm** (or the specific anatomic or cosmetic factors that limit margin distance should be noted). *Process*
2. If a patient has a melanoma, then the surgeon must document the measured surgical margin in the operative report. *Process*
3. If a patient has a **melanoma, then a clear histologic margin must be documented**. Process
4. If a patient has a melanoma **1 mm thick** (ie, T1), then the surgical excision **margins must be 1 cm** (or the specific anatomic or cosmetic factors that limit margin distance should be noted). *Process*
5. If a patient has a melanoma **1-2 mm thick** (ie, T2), then the surgical excision margins must be **1-2 cm** (or the specific anatomic or cosmetic factors that limit margin distance should be noted). *Process*
6. If a patient has a melanoma **>=2 mm thick** (ie, T3 or T4), then the surgical excision margins must be **2-3 cm** (or the specific anatomic or cosmetic factors that limit margin distance should be noted). *Process*

Table 2. Melanoma Quality Indicators Ranked As Valid

Indicators	Domain
If a surgeon performs SLNB or LND for melanoma, then the surgeon must be certified by the American Board of Surgery or equivalent board or international association.	Structure
If a patient has a melanoma in situ (ie, Tis), then the surgical excision margins must be 5 mm (or the specific anatomic or cosmetic factors that limit margin distance should be noted).	Process
If a patient has a melanoma, then the surgeon must document the measured surgical margin in the operative report.	Process
If a patient has a melanoma, then a clear histologic margin must be documented.	Process
If a patient has a melanoma ≤ 1 mm thick (ie, T1), then the surgical excision margins must be 1 cm (or the specific anatomic or cosmetic factors that limit margin distance should be noted).	Process
If a patient has a melanoma 1-2 mm thick (ie, T2), then the surgical excision margins must be 1-2 cm (or the specific anatomic or cosmetic factors that limit margin distance should be noted).	Process
If a patient has a melanoma ≥ 2 mm thick (ie, T3 or T4), then the surgical excision margins must be 2-3 cm (or the specific anatomic or cosmetic factors that limit margin distance should be noted).	Process
If a patient is to undergo an SLNB, then lymphosyntigraphy must be performed to identify the draining nodal basin(s).	Process
If a patient undergoes an SLNB, then the SLNs must be sent for permanent sectioning only (no frozen sections), unless a reason is documented.	Process
If a patient undergoes an SLNB, then the SLNs must be examined with serial sectioning/HE and with IHC if the HE analysis is negative or equivocal (ie, S-100, HMB-45, and MART-1).	Process
If a patient has a stages Ib or II melanoma, SLNB must be discussed with the patient.	Process
If a patient has clinically apparent/palpable lymphadenopathy, then an LND must not be performed without an antecedent histologic diagnosis.	Process
If a patient undergoes a cervical LND or CLND, then at least 15 regional lymph nodes must be resected and pathologically examined.	Process
If a patient undergoes an axillary LND or CLND, then at least 10 regional lymph nodes must be resected and pathologically examined.	Process
If a patient undergoes an inguinal LND or CLND, then at least five regional lymph nodes must be resected and pathologically examined.	Process
If a patient has a melanoma, then the pathology report must document Breslow thickness, Clark level, histologic ulceration, peripheral/radial and deep margin statuses, satellitosis, anatomic location of the lesion, regression, and mitotic rate.	Process
If a patient has a melanoma, then the pathology report must document Breslow thickness, Clark level, histologic ulceration, peripheral/radial and deep margin statuses, satellitosis, regression, and mitotic rate.	Process
If a patient undergoes an SLNB or LND for melanoma, then the pathology report must document the number of lymph nodes examined and the number of lymph nodes found to contain metastases.	Process
If a patient has clinically palpable nodal disease of the inguinofemoral nodes, then a pelvic CT or PET must be obtained to rule out pelvic lymphadenopathy.	Process
If a patient has a resected primary melanoma metastatic to regional lymph nodes or distant sites, then the patient must have a documented discussion regarding adjuvant therapy.	Process
if a patient has stages 0, I, or IIA melanoma, then an abdominal CT/MRI, pelvic CT/MRI, or PET scan are NOT indicated unless in response to specific signs or symptoms.	Process
If a patient is newly diagnosed with stage IV melanoma, then a serum LDH level must be measured.	Process
If a patient with melanoma has biopsy-proven or palpable nodal disease and no evidence of distant metastases, then the patient must undergo a LND.	Process
If a patient has a metastatic lymph node detected on SLNB, then a CLND must be performed except in the context of a clinical trial or if the patient has severe comorbidities.	Process
If a patient with melanoma has biopsy-proven, palpable nodal disease, then the patient should not undergo SLNB.	Process
If a patient is treated for melanoma, then stage-specific follow-up, including future skin exams, should be discussed and documented.	Outcome

NOTE. Validity was defined as 90% of the expert panel's rankings in the range of seven to nine (median also within the range of seven to nine).
Abbreviations: SLNB, sentinel lymph node biopsy; LND, lymph node dissection; SLN, sentinel lymph node; HE, hematoxylin and eosin; IHC, immunohistochemistry; CLND, complete lymph node dissection; CT, computed tomography; PET, positron emission tomography; MRI, magnetic resonance imaging; LDH, lactate dehydrogenase.

Table 3. Melanoma Quality Indicators Ranked As Not Valid

Indicators	Domain
If a surgeon performs SLNB for melanoma, then the surgeon must perform at least 12 SLNBs for melanoma per year.	Structure
If a surgeon performs SLNB for melanoma, then the hospital must monitor their surgeons' annual SLNB case volumes for melanoma.	Structure
If a surgeon performs LND for melanoma, then the surgeon must perform at least 12 LNDs for melanoma per year.	Structure
If a surgeon performs LND for melanoma, then the hospital must monitor their surgeons' annual LND case volumes for melanoma.	Structure
If a hospital cares for patients with invasive melanoma, then the hospital must participate in clinical trials.	Structure
If a hospital cares for patients with melanoma, then a dermatopathologist must review the biopsy, WLE specimen, and SLNs.	Structure
If a patient has a melanoma, then a shave biopsy must not be performed as the initial biopsy method.	Process
If a patient has a melanoma, then the initial biopsy must have a margin of 1-3 mm and a cuff of fat.	Process
If a patient has a biopsy of an extremity melanoma, then the longitudinal aspect of the incision must be made parallel to the axis of the extremity.	Process
If a patient has stages IB or II melanoma, SLNB and CLND must not be performed at the same operation to allow detailed histologic and IHC examination of the SLNs.	Process
If a patient has melanoma, then the pathology report must document tumor-infiltrating lymphocytes, vertical growth phase, angiolymphatic invasion, neurotropism, and histologic subtype.	Process
If a patient has melanoma, then the clinical or pathologic AJCC TNM and overall stage elements must be documented.	Process
If a patient has stages III or IV disease, then the discussion with the patient must include entry into potential clinical trials.	Process
If a patient has stages IIB or IIC melanoma, then an abdominal CT/MRI, pelvic CT/MRI, or PET scan are not indicated unless in response to specific signs or symptoms.	Process
If a patient has stage IIIA melanoma, then a CT of the chest, abdomen, and pelvis or a PET-CT scan must be obtained.	Process
If a patient has stages IIIB or IIIC melanoma, then a CT of the chest, abdomen, and pelvis or a PET-CT scan must be obtained.	Process
If a patient has stage IV melanoma, then a CT of the chest, abdomen, and pelvis or a PET-CT must be obtained.	Process
If a patient is newly diagnosed with stage IV melanoma, then a CT/MRI of the head must be obtained.	Process
If a patient has clinical stage IA (ie, T1aN0) melanoma, then a discussion of SLNB with the patient must be documented.	Process
If a patient has clinical stage IA (ie, T1aN0) melanoma with unfavorable characteristics (ie, positive deep margins, extensive regression, or high mitotic rate), then a discussion of SLNB with the patient must be documented.	Process
If a patient has clinical stage IA (ie, T1aN0) melanoma, then SLNB must be discussed with the patient.	Process
If a patient is to undergo an SLNB, then the SLNB must be performed under the same anesthesia but prior to WLE.	Process
If a patient has a positive Cloquet's node found intraoperatively, then a deep inguinal dissection must be performed.	Process
If a patient has more than three involved superficial nodes, then a deep inguinal dissection must be performed.	Process
If a patient has evidence of iliac or obturator lymphadenopathy, then a deep inguinal dissection must be performed.	Process
If a patient has limited (ie, one to two) distant metastases confined to the skin, subcutaneous tissues, or lungs, then the patient must have the metastases resected or must have a valid reason documented for not resecting the metastases.	Process
If a patient is to receive treatment, then the time from diagnosis to definitive surgery or first treatment must be less than 6 weeks.	Efficiency
If a hospital surgeon performs CLND for melanoma, then the hospital should monitor the lymphedema rates.	Outcomes
If an institution's physician treats melanoma, then that institution should monitor the stage-specific, 5-year survival rates for melanoma.	Outcomes

Abbreviations: SLNB, sentinel lymph node biopsy; LND, lymph node dissection; SLN, sentinel lymph node; WLE, wide local excision; CLND, complete lymph node dissection; IHC, immunohistochemistry; AJCC, American Joint Commission on Cancer; CT, computed tomography; MRI, magnetic resonance imaging; PET, positron emission tomography.

Table 4. Assessment of Adherence With the Melanoma Quality Indicators at the Patient and Hospital Levels

Indicator	No. of Patients	Patient-Level Assessment (%)	Hospital-Level Assessment (%)*
Total No. of patients	47,643		
If a patient has a melanoma resected, then a clear histologic margin must be documented.	41,873	95.1	78.6
If a patient undergoes a cervical LND or CLND, then at least 15 regional lymph nodes must be resected and pathologically examined.	2,185	28.6	17.3
If a patient undergoes an axillary LND or CLND, then at least 10 regional lymph nodes must be resected and pathologically examined.	2,690	27.1	17.9
If a patient undergoes an inguinal LND or CLND, then at least five regional lymph nodes must be resected and pathologically examined.	2,029	45.0	24.9
If a patient undergoes an SLNB or LND for melanoma, then the pathology report must document the number of lymph nodes examined and the number of lymph nodes found to contain metastases.	11,280	96.5	83.0
If a patient has a resected primary melanoma metastatic to regional lymph nodes or distant sites, then the patient must have a documented discussion regarding adjuvant therapy.	7,877	36.9	14.1
If a patient is newly diagnosed with stage IV melanoma, then a serum LDH level must be measured.	3,095	11.8	3.7
If a melanoma patient has biopsy-proven or palpable nodal disease and no evidence of distant metastases, then the patient must undergo an LND.	1,154	58.1	17.8
If a patient has a metastatic lymph node detected on SLNB, then a CLND must be performed except in the context of a clinical trial† or if the patient has severe comorbidities.	2,872	52.6	25.7
If a patient with melanoma has biopsy-proven, palpable nodal disease, then the patient should not undergo SLNB.	2,674	69.2	60.8

NOTE. Assessments were based on data from 1,249 hospitals, but not all hospitals had patients eligible for all quality measures. Lymph node counts included nodes examined in SLNB and CLND combined.

Abbreviations: LND, lymph node dissection; CLND, complete lymph node dissection; SLND, sentinel lymph node biopsy; LDH, lactate dehydrogenase.

*Proportion of hospitals that were adherent with the measure in 90% or more of their patients.

†Clinical trials participation was not specifically reported to the NCDB but would be a small proportion of patients in this instance.