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Incidence and survival in children and adolescents from 1967 to 2011: Childhood Cancer Registry of Piedmont

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INTRODUCTION

Several papers have reported **childhood cancer increases** world wide

Survival is one of the most important **indicator** of the **quality of care** for **cancer patients**

OBJECTIVES OF THE STUDY

To provide updated information on cancer incidence and survival in children and adolescents based on data from the Childhood Cancer Registry of Piedmont (CCRP)

MATERIALS AND METHODS

- CCRP: the **oldest** and **largest pediatric population-based** Cancer Registry in Italy
- Quality of data collected by the CCRP has been uniformly high
- **Data collection:**
  - Since **1967**: **incident cases of cancer in children**
  - Since **2000**: **incident cases in adolescent**
- Site, morphology and behavior: **ICD-0-3**
- 12 tumor types grouped according to the International Classification of Childhood Cancer **(ICCC)**
- All malignant cerebral tumors and intracranial neoplasms of benign histology included

MATERIALS AND METHODS

➢ Incidence rates

- per million children per year
- for children and adolescents
- resident in Piedmont
- gender: M, F, MF
- age classes: 0, 1-4, 5-10, 10-14, 0-14, 15-19, 0-19
- ICCC diagnostic categories

➢ Incidence time trends

- whole period (1976-2011)
- most recent period (2000-2011)
- APC: annual percent change
- Joinpoint regression on world age-standardized incidence rates

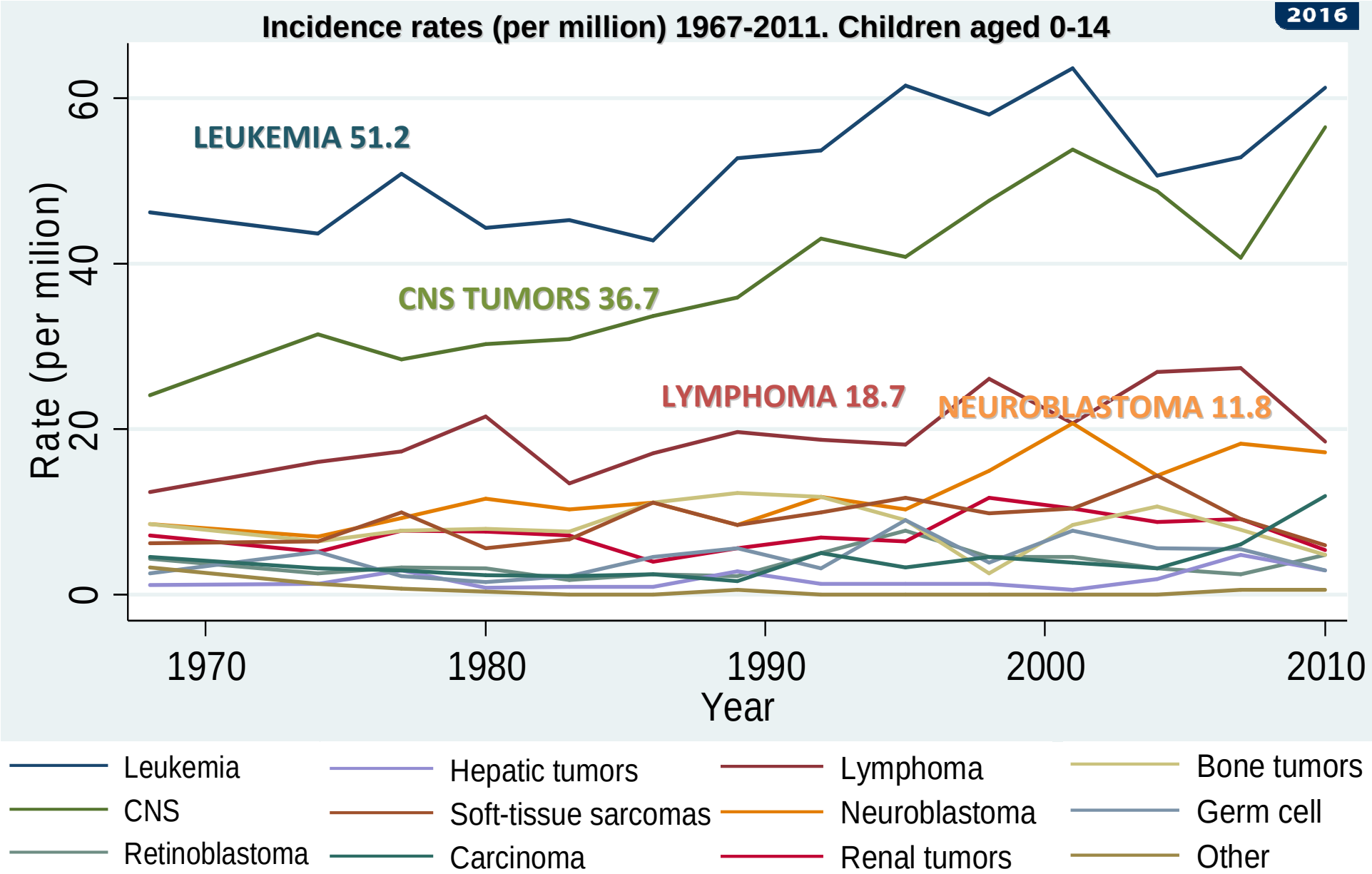
MATERIALS AND METHODS

Statistical analysis - survival

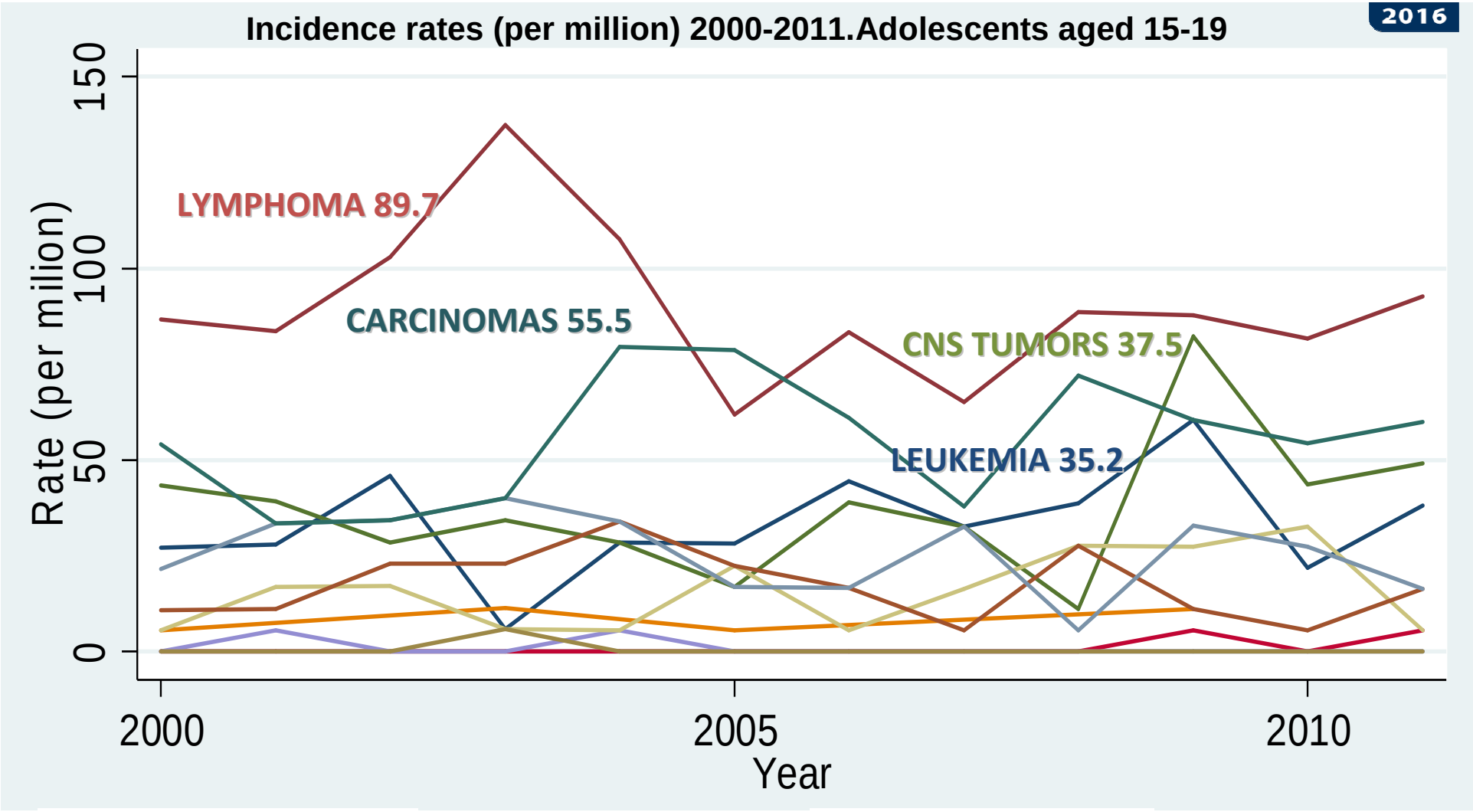
- **Kaplan-Meier method** used to estimate cumulative survival percentages

- **Cohort method**
  - 9 consecutive 5-year diagnosis cohorts (1967-71, 1972-76…) until 2011 for children
  - 2 consecutive 6-year diagnostic cohorts starting from 2000 until 2011 for adolescents (15-19 years)

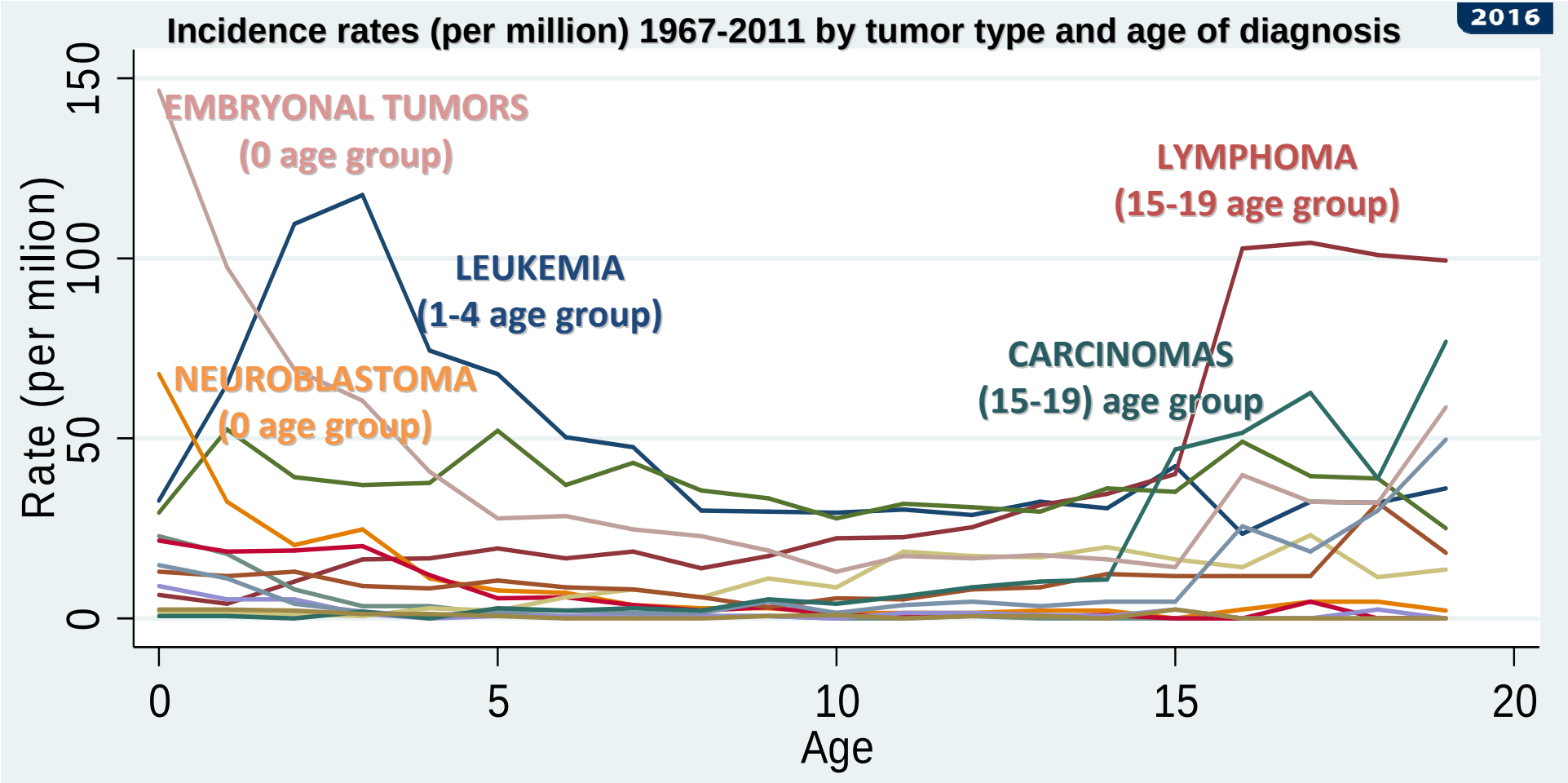
RESULTS


Incidence rates (per million) 1967-2011. Children aged 0-14
LEUKEMIA 51.2
CNS TUMORS 36.7
LYMPHOMA 18.7
NEUROBLASTOMA 11.8
Rate (per milion)
0
20
40
60
1970
1980
1990
2000
2010
Year
Leukemia
CNS
Retinoblastoma
Hepatic tumors
Soft-tissue sarcomas
Carcinoma
Lymphoma
Neuroblastoma
Renal tumors
Bone tumors
Germ cell
Other

RESULTS


Incidence rates (per million) 2000-2011.Adolescents aged 15-19
Rate (per milion)
0
50
100
150
2000
2005
2010
Year
LYMPHOMA 89.7
CARCINOMAS 55.5
CNS TUMORS 37.5
LEUKEMIA 35.2
Leukemia
CNS
Retinoblastoma
Hepatic tumors
Soft-tissue sarcomas
Carcinoma
Lymphoma
Neuroblastoma
Renal tumors
Bone tumors
Germ cell
Other

RESULTS

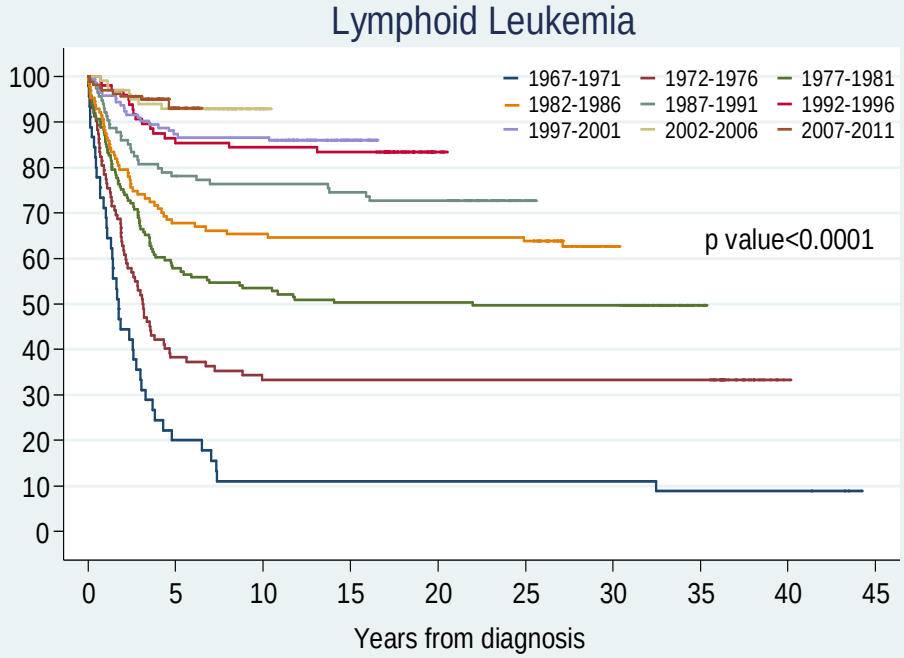

Incidence rates (per million) 1967-2011 by tumor type and age of diagnosis
EMBRYONAL TUMORS
(0 age group)
LYMPHOMA
(15-19 age group)
LEUKEMIA
(1-4 age group)
CARCINOMAS
(15-19) age group
NEUROBLASTOMA
(0 age group)
Rate (per milion)
0
50
100
150
0
5
10
15
20
Age
Leukemia
CNS
Retinoblastoma
Embryonal
Hepatic tumors
Soft-tissue sarcomas
Carcinoma
Lymphoma
Neuroblastoma
Renal tumors
Bone tumors
Germ cell
Other

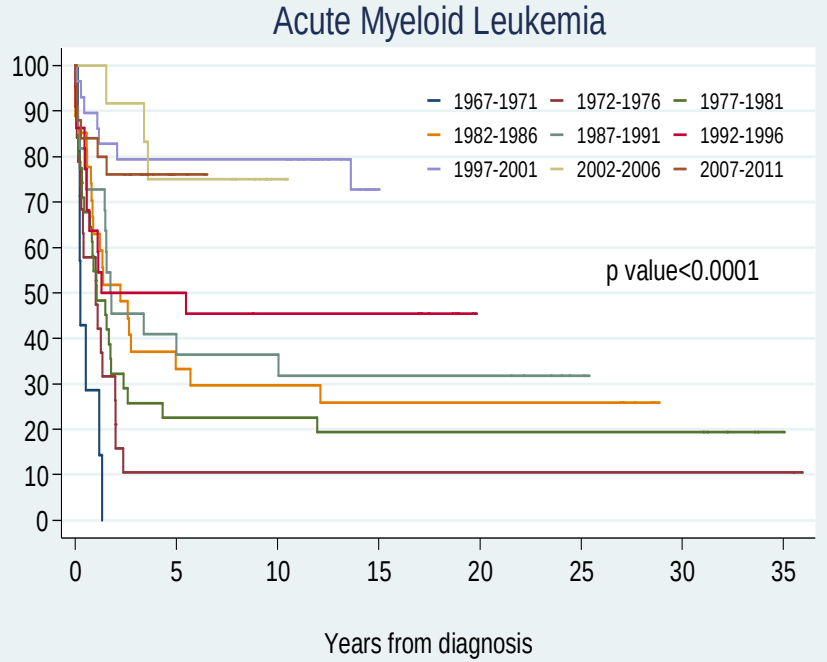
RESULTS

ICCC		Trend analysis for the whole period (1976-2011)	Trend analysis for the more recent period (2000-2011)
		APC	APC
All tumor types		1.11 (0,8;1.5)	0.82 (-1.9;3.7)
Leukemia		0.64 (0,0; 1.2)	-0.67 (-5.4;4.5)
Lymphomas	1976-2007	1.67 (0.6;2.7)	-1.41 (-6.8;4.3)
	2007-2011	-12.20 (33.2;15.4)	
CNS tumors		1.95 (1.3;2.6)	0.27 (-4.5;4.2)
Neuroblastoma		1.19 (0.2;2.1)	-2.36 (-7.0;2.5)

RESULTS

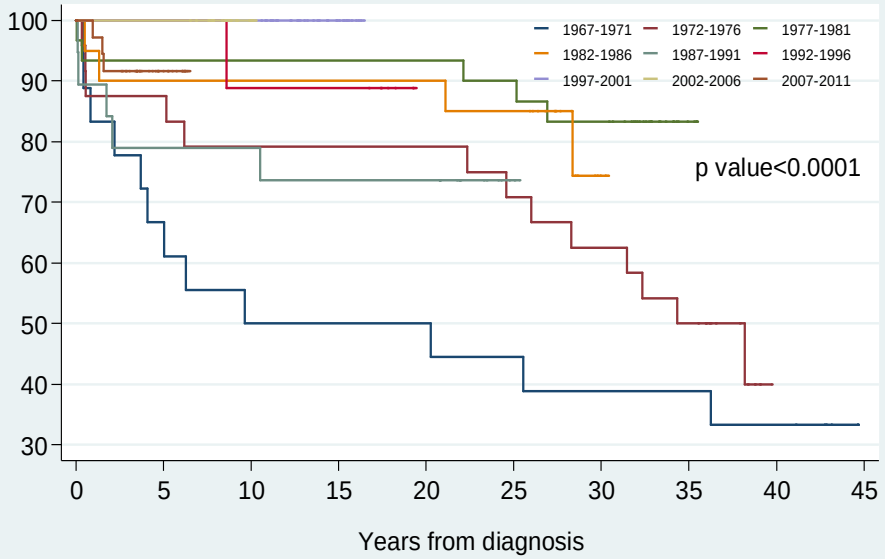
Cumulative survival by 5-year cohorts of diagnosis in children

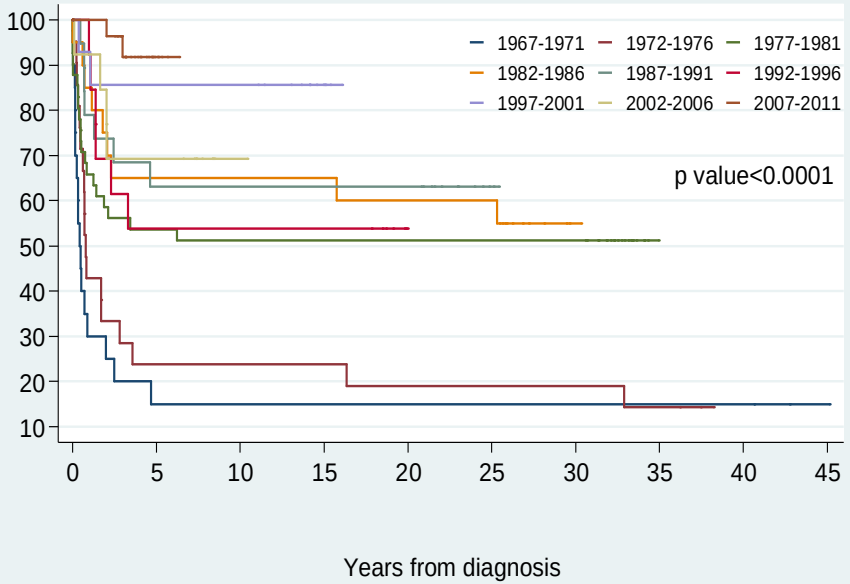




RESULTS

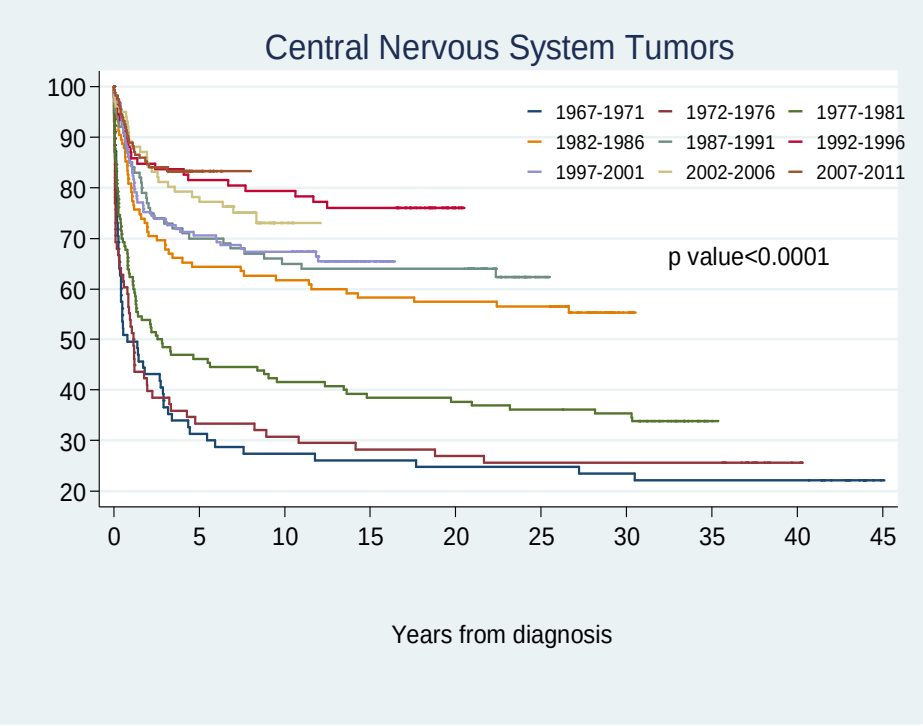
Cumulative survival by 5-year cohorts of diagnosis in children

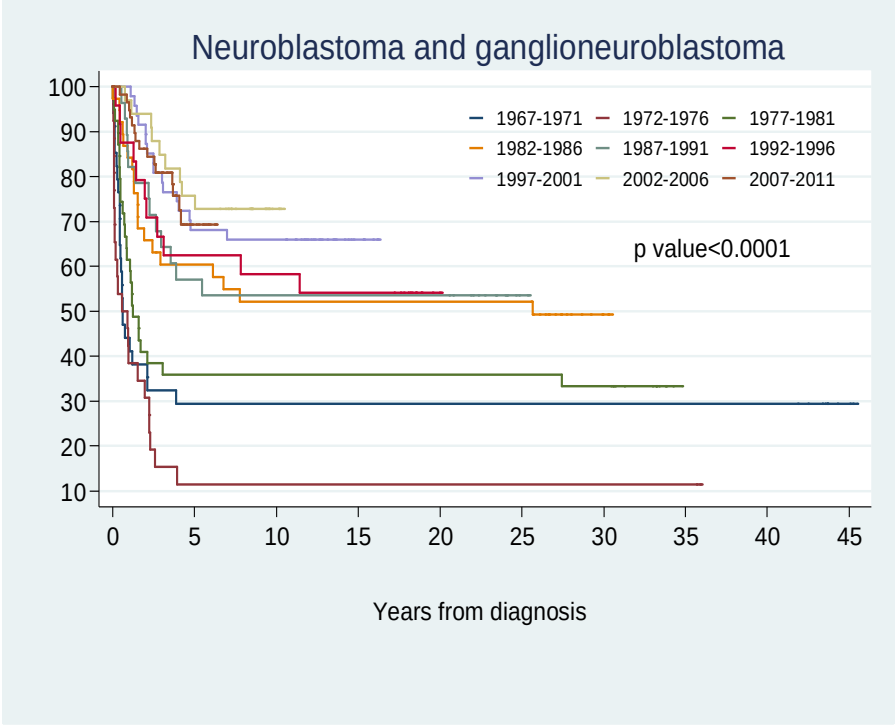




RESULTS

Cumulative survival by 5-year cohorts of diagnosis in children

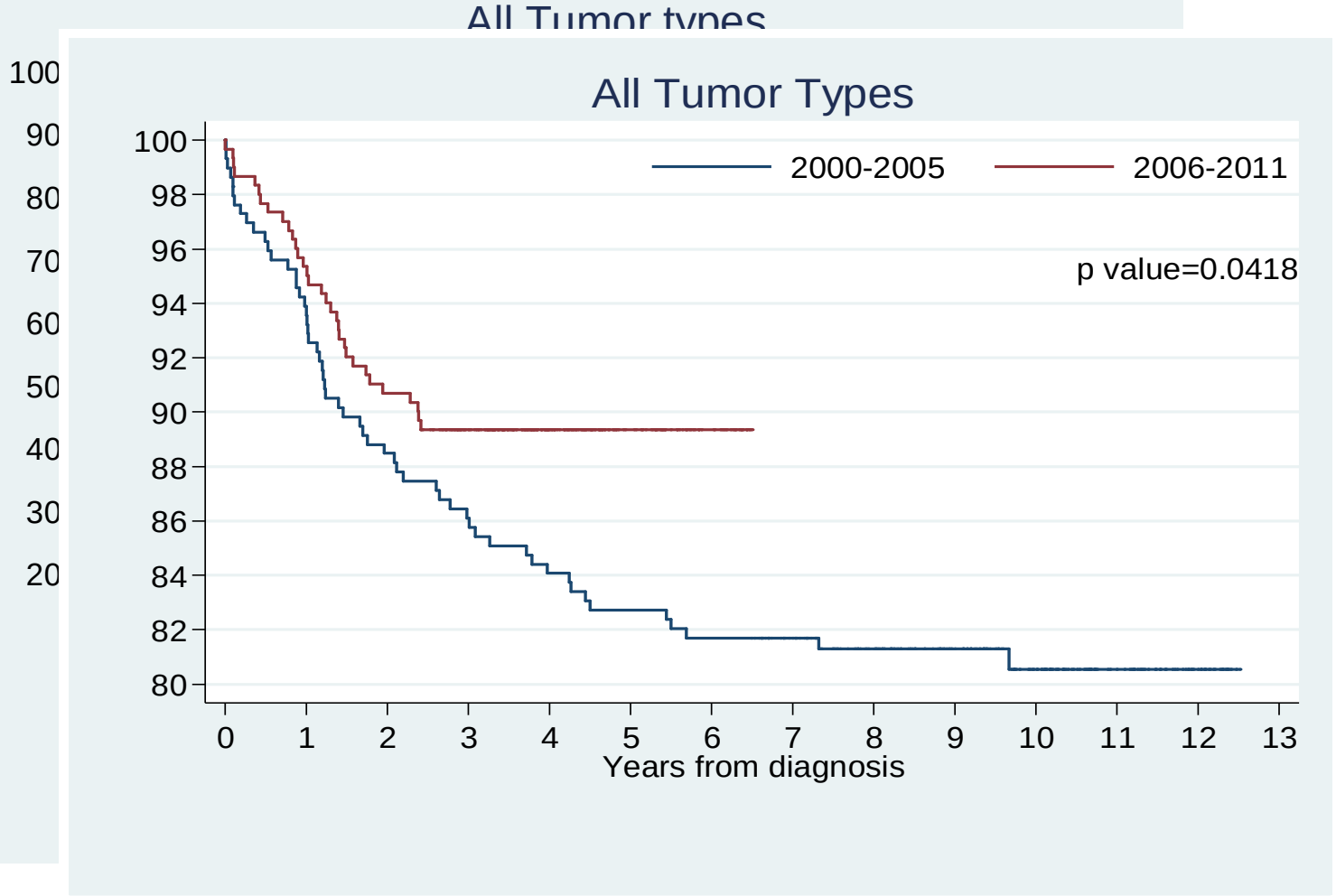




RESULTS

Cumulative survival by 5-year cohorts of diagnosis in children

Cumulative survival by 6-year cohorts of diagnosis in adolescents



CONCLUSIONS - INCIDENCE

- Trends for the whole period: statistically significant increases for several tumor types

- Trends for the most recent period: dominated by very large variation in incidence rates

- There is still no satisfactory explanation for the observed increase of the incidence in the past, so we should focus on finding what is behind this increase

CONCLUSIONS - SURVIVAL

- Positive trend in survival after childhood and adolescence cancer in recent years in Piedmont → cancer registration important monitor of survival at the population level.

- Adolescents have sometimes poor prognoses: “big children” or “small adults”. Improvements in survivals might occur after the development of specifically studied protocols for the treatment of this vulnerable group of patients.