



Cancer incidence in children – results from Luxembourg’s National cancer registry, 2014-2022

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Objectives:

To describe for the first time the distribution of new cancer cases in children aged between 1 and 14 years at diagnosis and resident in Luxembourg by clinical characteristics and to compare the situation of Luxembourg with other countries.

Methods:

Data from the National Cancer Registry of Luxembourg was extracted for all children aged below 15 years and for all tumors diagnosed in Luxembourg between 2014-2022 (except non-melanoma skin cancer). Non-invasive tumors of the central nervous system and intracerebral endocrine glands were eligible and grouped with invasive tumors for the same location. Multiple tumors were treated according to established international rules (IARC/IACR, 2004). Only the first invasive tumor per cancer type, per pair of organs or tissue, occurring during the period were considered as eligible, if the 2 tumors were from the same morphological group. Diagnosis groups were created using the 2017 update of the International Classification of Childhood Cancer (ICCC), 3rd edition. Raw and standardized incidence rates were calculated, using European (Eurostat, 2013) and World (Doll et al., 1966) population, in order to compare our results with other countries.

Results:

The quality indicators meet the ICCC recommendations; in particular, 92.5% of cases have cytological or histological diagnosis confirmation and only 2.7% have a non specified morphology. 147 new cases of cancer were diagnosed including 44.2% girls. 46% of children were aged between 0 to 4 years old, 24% between 5 to 9 and 30% 10 to 14. Each year, on average, 16 new cases of cancer are diagnosed. The age-standardized annual incidence rate is 164.6 per 1 million children, with a higher rate among boys (179.4 versus 149.1 per 1 million children), which corresponds to a sex ratio M/F of 1.19 (*table 1*). Overall, most frequent diagnosed cancer types are the central nervous system (31.3%), leukemia (26.5%) followed by lymphoma (10.9%). Hematologic malignancies represent nearly 40% of all cancers. The specific incidence rate by age is higher for boys, except for 10 to 14 years old (*figure 1*). The distribution between diagnosis groups is presented on *figure 2*. Compared with international age standardized incidence rates (world standard population), Luxembourg has higher rates than France, Netherlands and Switzerland, but lower rates than those from Belgium (*table 2*). The age standardized incidence rate by diagnosis groups shows similar results, except for the central nervous system with a rate of 53.8 per 1 million children.

Table 1 : Children (< 15 years) cancer incidence

	N	N/year	%	Raw	Incidence rates			
					Standardised (Eu 2013)	CI95%	Standardised (World)	CI95%
All cancers	147	16	100.0	166.5	164.6	164.2-165.1	171.4	170.5-172.3
Sex								
Boys	82	9	55.8	181.1	179.4	178.8-180.0	186.4	185.2-187.7
Girls	65	7	44.2	151.1	149.1	148.6-149.7	155.7	154.5-156.9
Period								
2014 - 2016	54	6	36.7	190.9	188.7	187.9-189.5	194.5	192.9-196.1
2017 - 2019	43	5	29.3	146.4	145.9	145.2-146.6	148.0	146.6-149.4
2020 - 2022	50	6	34.0	163.1	160.6	159.9-161.3	172.7	171.2-174.2

N : Number of new malignant tumors

N/year : Number of new malignant tumors per year

%: Proportion

Raw incidence rate, per 1 million childrens per year

Standardised (European standard population – 2013) incidence rate, per 1 million children per year

CI95%: 95% confidence interval for standardised incidence rate

Source: RNC

Conclusion:

The results are the first children data in Luxembourg and cover a wide period of time. It gives a first overview of the situation in Luxembourg and allow for some comparisons with other countries. The main limitation encountered is the size of the analysis population: 147 cancers, which reflects the size relatively small of the population of Luxembourg. The IICC has adopted an arbitrary threshold of 200 cancers of the child under 15 years of age as being necessary and sufficient to produce the incidence of cancers of the child. Groupings were made to prevent the number of cancer cases from being too low to obtain stable estimates, in particular by accumulating data over a period of 9 years. However, the small numbers encountered in certain categories may lead to fluctuation in estimates of impacts, which must be interpreted with caution, especially for country comparisons.

Table 2 : Children (<15 years old) age-standardised (world population) incidence rates for cancers, per diagnosis groups. Country comparison

	Luxembourg (2014-2022)	France (2014-2020)	Belgium (2011-2020)	Netherlands (2010-2013)	Swiss (2005-2014)
All cancers	171.4	161.2	186.8	169.6	165.6
Diagnosis groups (ICCC-3 2017)					
I. Leukemias, Myeloproliferative And Myelodysplastic Diseases	48.0	46.4	50.6	48.6	57.1
II. Lymphomas and reticuloendothelial neoplasms	17.5	15.8	21.2	16.2	16.6
III. CNS* and Miscellaneous Intracranial and Intraspinal Neoplasms	53.8	42.3	48.6	43.8	37.5
IV. Neuroblastoma And Other Peripheral Nervous Cell Tumors	13.0	13.1	12.9	11.0	11.7
V. Retinoblastoma	0.0	5.2	5.9	8.2	4.2
VI. Renal tumors	3.5	9.0	9.9	9.0	9.1
VII. Hepatic tumors	4.0	1.9	2.7	2.1	1.5
VIII. Malignant bone tumors	5.1	6.8	6.6	8.4	5.9
IX. Soft Tissue And Other Extraosseous Sarcomas	9.8	9.4	10.2	9.7	11.6
X. Germ Cell Tumors, Trophoblastic Tumors And Neoplasms Of Gonads	4.8	5.5	6.4	5.8	4.8
XI. Other Malignant Epithelial Neoplasms And Malignant Melanomas	12.1	5.0	11.8	6.3	5.1
XII. Other And Unspecified Malignant Neoplasms	0.0	0.6	0.0	0.5	0.5

Standardised incidence rates (world population standard), per 1 million children per year

ICCC-3 2017: International Classification of Childhood Cancer, 3rd edition, 2017 update ; *CNS: Central Nervous System

Sources:

Luxembourg: RNC

France: Children cancer national registry

Belgium: Cancer in children and adolescents in Belgium 2004-2020, Belgian Cancer Registry, Brussels, 2023

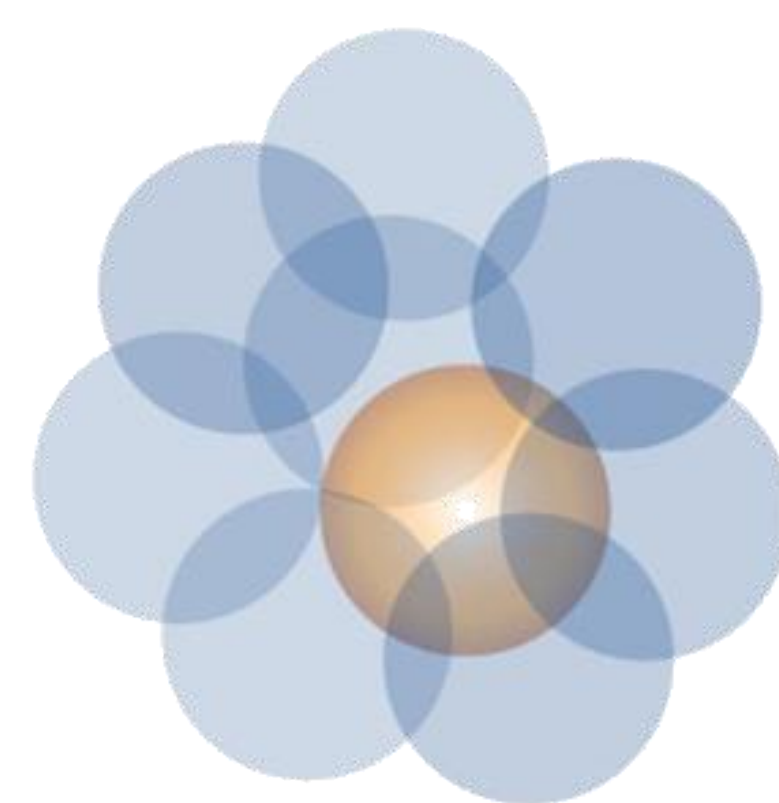
Netherlands: ECIS-European Cancer Information System - Childhood incidence historical data

Swiss: G. Sommer, M. Schindler, S. Redmond, V. Pfeiffer, G. Konstantinoudis, R. A. Ammann, et al. Temporal trends in incidence of childhood cancer in Switzerland, 1985–2014. Cancer Epidemiology 2019 Vol. 61 Pages 157-164

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Figure 1 : Cancer specific incidence rates per age group, by sex

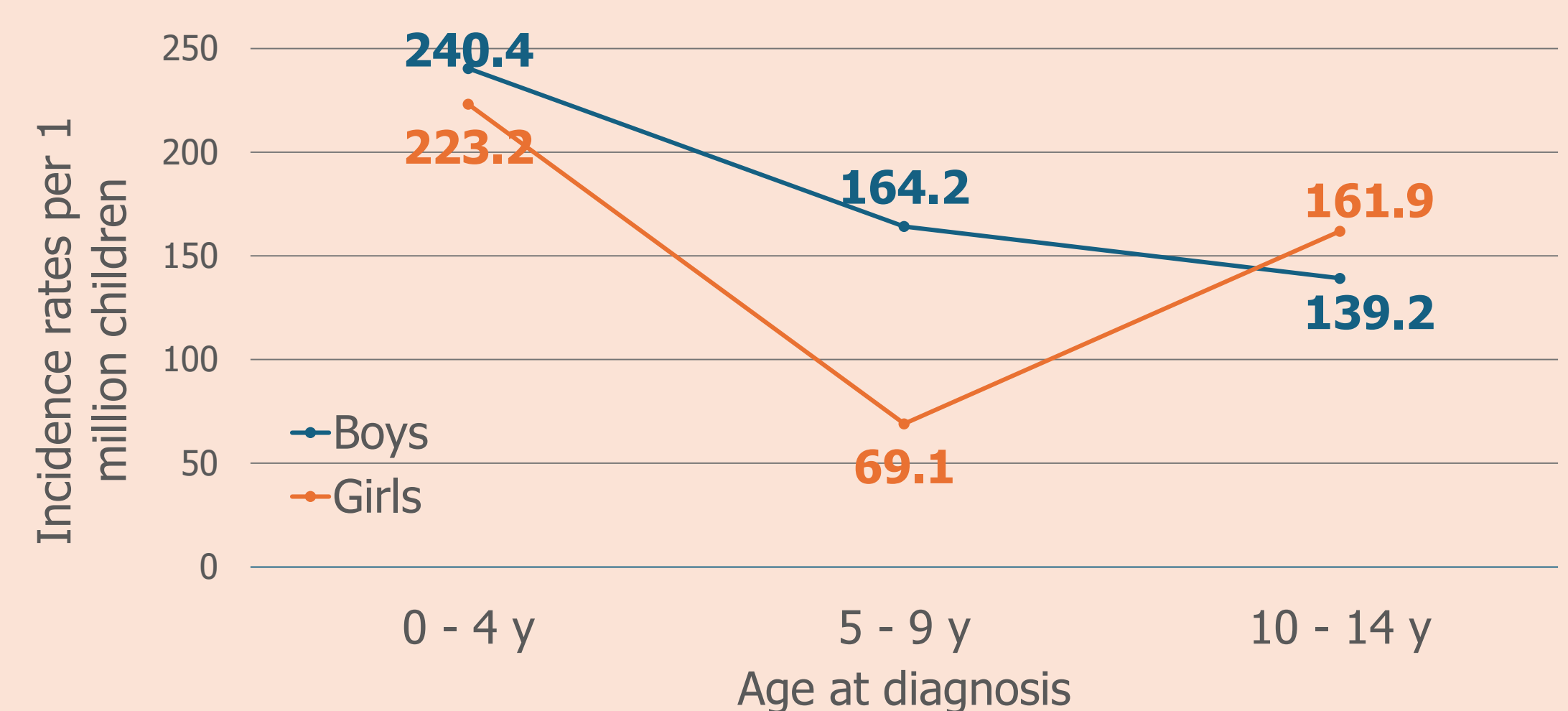
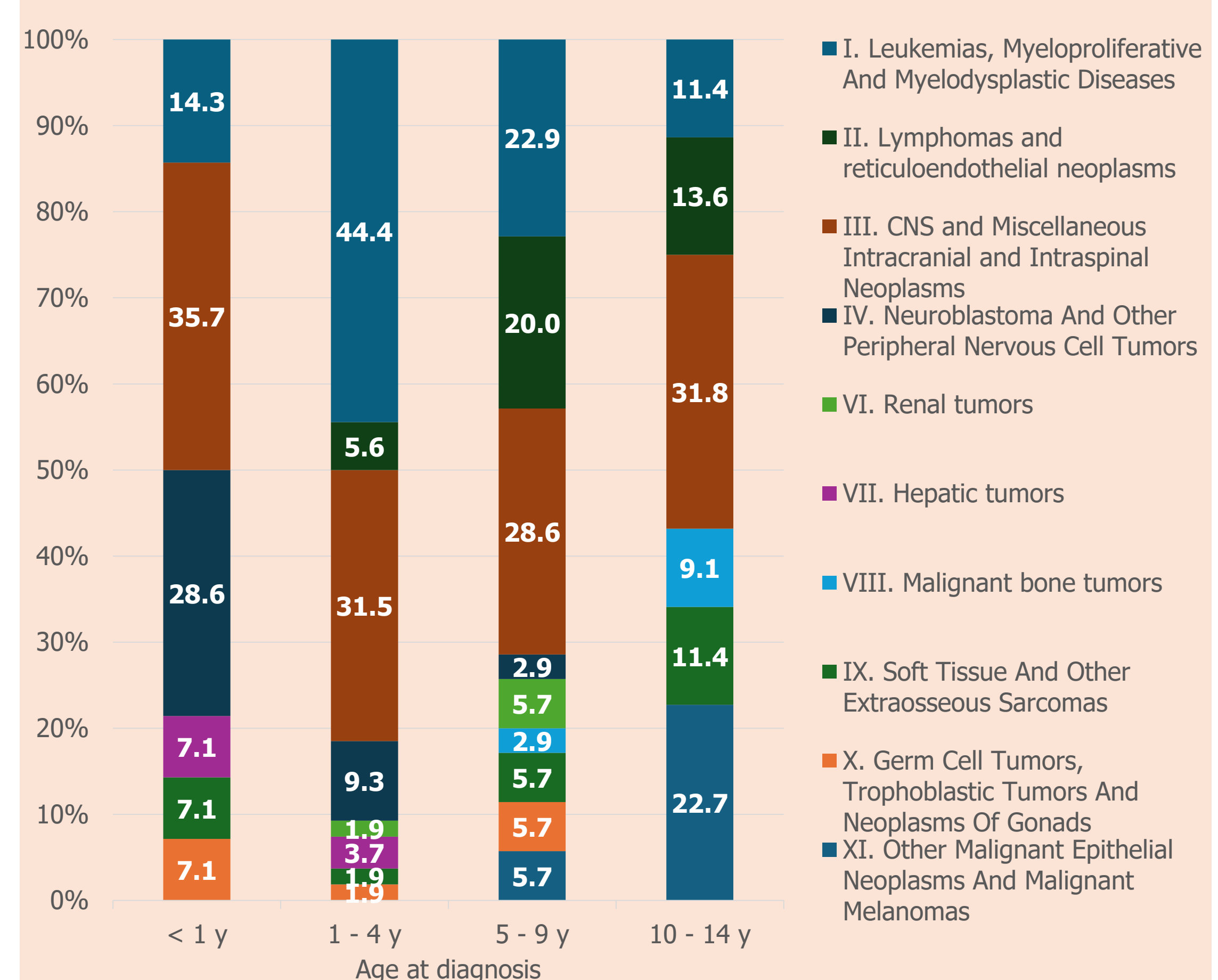


Figure 2 : Proportion of main diagnosis groups by age group



"V. Retinoblastoma" & "XII. Other And Unspecified Malignant Neoplasms" groups are not shown (0 case).

*for CNS, non invasive tumors were grouped with invasive ones

ICCC-3 2017 : International Classification of Childhood Cancer, 3rd edition, update 2017

CNS : Central Nervous System

Source: RNC

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