CANCER EDUCATION DAY

Cancer In Adolescents & Young Adults: An Overview

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Presenter Disclosure

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Adolescents & Young Adults (AYA) With Cancer-1

- In the recent few years there has been increasing interest in AYA cancers.
- There has been various definitions of AYA age group when related to cancers. The most commonly used definition is 15-39 years.
- Studies have shown that the improvement of outcome of cancer treatment in this age group has lagged behind children and older adults.

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Keegan et al. Cancer, 2018

Adolescents & Young Adults (AYA) With Cancer-2

- Cancers in AYA population constitute 5% of the total cancer incidence.
- 7600 AYA patients were diagnosed with cancer in Canada in 2013.
- 70,000 AYA patients are diagnosed with cancer in the US annually.
- Female: Male incidence is 1.67; largely due to breast cancer and to a less extent thyroid cancer.

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SEER program database
Close et al. CA Journal 2019
Canadian Partnership Against Cancer Report 2017

Incidence Of Cancer By Age Group In Children AND AYA

Table. Incidence of All Invasive Cancer by Age[a]

Age, y	Incidence, No.
0-4	200
5-9	110
10-14	125
15-19	200
20-24	350
25-29	550
30-34	830
35-39	1300

[a] Per million per year.[7]

Barr. JAMA Peds, 2016

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AYA Oncology: An Emerging Field

- AYA oncology started to develop as a field of study, research and activism in the past 15 years to address the lag of progress in survival for this age group and trying to understand and overcome the obstacles that contribute to this phenomenon.
- There was a landmark study published in 2006 by Dr. Bleyer and his colleagues in the US that paved the road into developing this field.

Thomas. JCO, 2010
Bleyer. NIH publication, 2006

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Most Common Cancers In AYA Canadian Statistics

FIGURE 1
Most common cancers by age

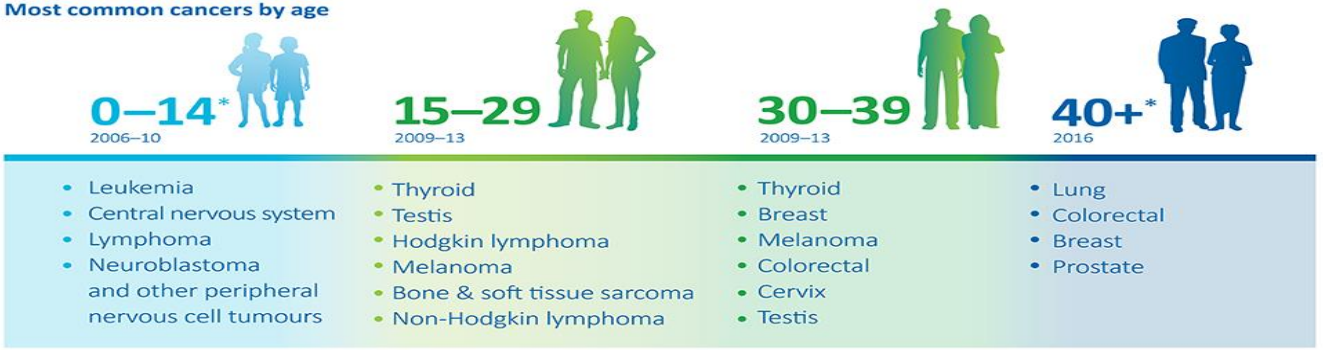

Figure 1
Based on rates age-standardized to the 2011 Canadian population.
Data exclude the territories.
QC: Data were not available for 2011, 2012 and 2013. The 2010 data were therefore used for 2011, 2012 and 2013.
Data Source: Statistics Canada, Canadian Cancer Registry; *Canadian Cancer Society, Canadian Cancer Statistics.

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Most Common Cancers In AYA US Statistics (Males)

Age-Specific SEER Incidences of Selected Invasive Cancers in the Adolescent and Young Adult Population (2011-2015)[7]

	Age, Years					
Diagnosis	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**15-39***
Males						
All diagnoses	23.8	34.8	50.1	67.8	91.1	54.8
Testicular cancer	4.0	10.4	15.1	14.3	11.9	11.1
Melanoma	0.8	1.9	4.1	6.7	10.1	4.9
Non-Hodgkin lymphoma	2.6	3.0	3.9	5.3	8.1	4.7
Colorectal cancer	0.6	1.3	2.9	5.2	10.4	4.3
Thyroid cancer	0.9	2.0	3.5	5.7	7.4	4.0
Leukemias	3.7	3.1	3.4	4.0	5.0	3.9
Hodgkin lymphoma	3.0	3.9	3.8	3.7	3.0	3.5
CNS tumors	2.6	2.4	3.1	4.0	4.2	3.3
Soft tissue sarcoma	1.2	1.4	1.6	2.1	2.2	1.7
Bone sarcoma	1.9	0.9	0.7	0.7	0.7	1.0
Other cancer	2.5	4.5	8.0	16.0	28.1	12.4

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Coccia. Journal of Oncology Practice, 2019
SEER Program Database

Most Common Cancers In AYA US Statistics (Females)

Age-Specific SEER Incidences of Selected Invasive Cancers in the Adolescent and Young Adult Population (2011-2015)[7]

	Age, Years					
Females	15-19	20-24	25-29	30-34	35-39	15-39*
All diagnoses	22.7	37.9	68.1	118.2	184.6	89.8
Breast cancer	0.1	1.6	9.4	28.0	61.9	21.7
Thyroid cancer	5.3	10.7	17.9	26.4	32.8	19.1
Melanoma	1.1	4.7	8.2	12.6	14.1	8.3
Cervix/uterus cancer	0.1	1.0	5.0	9.6	12.9	6.0
Colorectal cancer	0.8	1.4	2.8	5.6	9.6	4.2
Hodgkin lymphoma	3.0	4.2	3.9	3.1	2.5	3.3
Non-Hodgkin lymphoma	1.4	2.1	2.9	3.9	5.7	3.3
Leukemias	2.6	2.3	2.6	3.1	3.9	2.9
CNS tumors	2.2	2.0	2.5	2.9	3.1	2.6
Soft tissue sarcoma	1.1	1.2	1.2	1.6	2.0	1.5
Bone sarcoma	1.1	0.7	0.7	0.4	0.6	0.7
Other cancer	3.8	6.1	11.0	21.0	35.5	16.2

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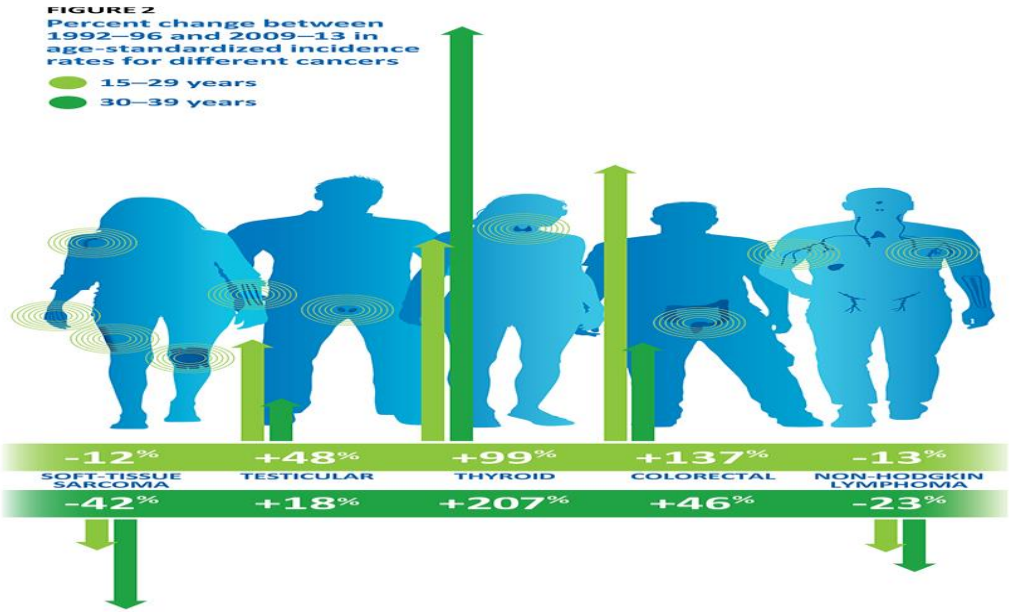
Incidence Of Some Cancers Is Increasing In AYA Patients



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Important Points To Remember About Incidence & Types of AYA Cancers

- Four types of cancer are considered AYA cancers as they peak in this age group: Testicular Cancer Hodgkin's Lymphoma, Bone Cancers (Osteosarcoma & Ewing Sarcoma), Cervical Cancer.
- Increase in incidence of thyroid cancer is largely due to advanced diagnostic techniques and screening.
- Decreased incidence of sarcomas and NHL is largely due to better control of the HIV epidemic thus decreasing AIDS associated lymphoma and Kaposi sarcoma.

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AYA Cancer Survival Data

- Cancer survival has improved significantly over the past 4 decades due to advancement in diagnostic and therapeutic measures.
- According to the US SEER data report for the period between 1957-2014, cancer survival in children have improved by 25%. Older adults had about 20% improvement. AYA patients had about 15% improvement.
- Survival gains among AYA patients have paralleled those of pediatric patients since year 2000.

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Coccia. Journal of Oncology Practice, 2019
SEER Program Database

AYA Cancer Survival Ratios In Canada

TABLE 1

FIVE-YEAR RELATIVE SURVIVAL RATIO BY CANCER TYPE AND AGE GROUP, CANADA — 2004–08

	15–29 Years	30–39 Years
CANCER TYPE	RATIO	RATIO
Thyroid	99.6	99.8
Hodgkin lymphoma	96.4	93.5
Testis	95.8	97.2
Melanoma	94.2	92.7
Uterus	92.2	90.5
Cervix	87.9	87.3
Ovary	87.1	77.8
Ependymoma	85.5	93.9
Low-grade astrocytoma	85.1	73.8
Non-Hodgkin lymphoma	83.4	81.1
Breast	83.1	84.1
Soft-tissue sarcoma	69.9	73.2
Colorectal	66.2	68.3
Acute lymphoid leukemia	66.0	61.2
Acute myeloid leukemia	66.0	55.3
Bone	62.4	71.6
Medulloblastoma	50.7	63.1
Glioblastoma	26.5	25.8
All Cancers	86.3	83.4

Table 1
Data exclude QC and the territories.
Data source: Statistics Canada, Canadian Cancer Registry.

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Cancer Survival Among AYA Patients In Canada Is Improving

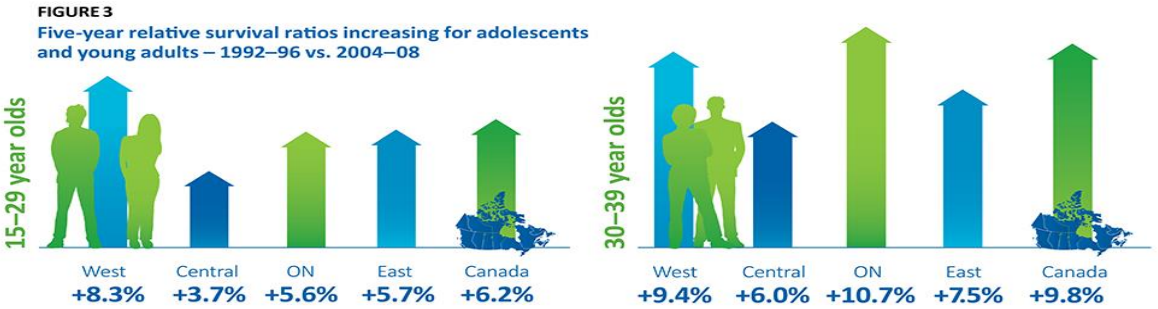

Figure 3
West includes AB and BC; Central includes MB and SK; East includes NB, NS, NL and PE. Data exclude QC and the territories.
Data source: Statistics Canada, Canadian Cancer Registry.

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US Cancer Survival Data Show Improvement Over The Past 15 Years

TABLE 3. Trends in 5-Year Relative Cancer Survival by Age and Sex, 2000 to 2014

	YEARS OF DIAGNOSIS: 5-YEAR SURVIVAL (SE), %[a]		
AGE	2000-2002	2003-2005	2008-2014
Male			
<14 y	79.0 (0.6)	81.3 (0.6)	83.1 (0.4)
15-39 y	75.7 (0.3)	77.5 (0.3)	80.2 (0.2)
≥40 y	63.9 (0.1)	64.4 (0.1)	65.6 (0.1)
Female			
<14 y	80.0 (0.7)	82.2 (0.6)	83.7 (0.4)
15-39 y	83.3 (0.2)	84.7 (0.2)	86.4 (0.1)
≥40 y	62.2 (0.1)	62.9 (0.1)	65.8 (0.1)

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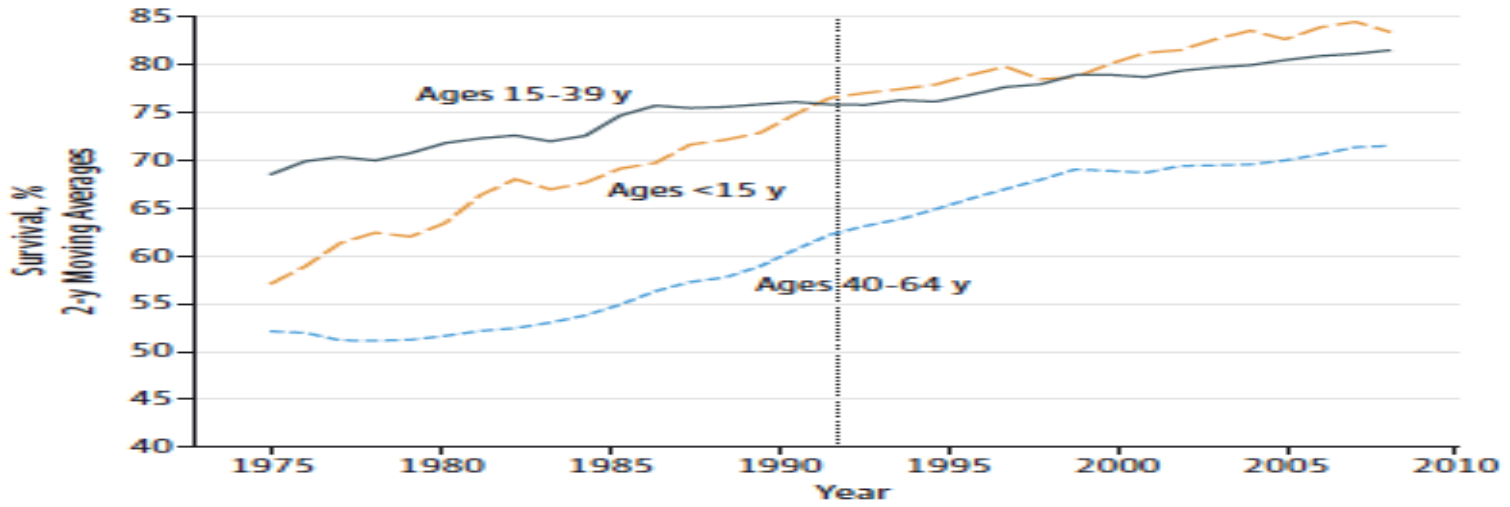
Improvement In Cancer Survival Of Various Age Groups

Figure 1. Five-Year Relative Survival by Age and Calendar Year of Diagnosis, 1975-2008



Relative survivals in individuals younger than 15 years catches up with and thereafter exceeds that in individuals aged 15 to 39 years. Adjusting for human immunodeficiency virus–related cancer in men (Kaposi sarcoma and non-Hodgkin lymphoma) and thyroid cancer in women.

Barr. JAMA Peds, 2016

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What Are The Reasons For Slower Progress In AYA Cancer Survival

- Biologic differences from childhood and older adult cancers leading to poorer outcome in some types of cancer (ALL, breast cancer, colorectal cancer).
- Lack of investment in research dedicated to AYA cancer (0.4% of cancer research funds in Canada are dedicated to AYA specific cancer research).
- Psychosocial issues (developmental, financial, family support, etc) which affects compliance with treatment.
- Lower rate of enrollment in clinical trials (around 14% for AYA compared to 60% for children in the US).
- Delay in diagnosis: Due to biological or psychosocial factors.

Barr. JAMA Peds, 2016
Canadian Partnership Against Cancer Report 2017
Coccia. Journal of Oncology Practice, 2019
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Special Issues Peculiar To AYA Cancer Care

"Delay" in diagnosis

Financial issues before, during, and after treatment

Location of care and clinical trial enrollment

Adherence to therapy

Need for psychological support

Rehabilitation and exercise

Sexuality and body image

Oncofertility

Transitions in medical management

Palliative and end-of-life care

Barr. JAMA Peds, 2016

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Social Issues Faced By AYA Cancer Patients

AGE	SOCIAL AND DEVELOPMENTAL CONCERNS
Mid-adolescence: <18 y	• Interrupted social skills development • High school achievement/graduation delays • Delays in living independently
Emerging adulthood: 18-25 y	• Delays in higher education • Interruptions in employment • Barriers to achieving financial independence • Difficulties obtaining adequate health insurance
Young adulthood: 26-39 y	• Difficulty developing and maintaining relationships with significant others/spouses • Problems with sexual function and intimate relationships • Fertility issues impacting parenthood • Barriers to achieving financial independence • Difficulties obtaining adequate health insurance

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Financial And Future Employment Impact Among AYA Cancer Survivors

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How Can We Improve: Future Directives

- Establish AYA focused clinical care models (e.g. AYA cancer program) through collaboration between pediatric and adult cancer care providers.
- Address unique psychosocial needs for AYA by providing access to psychologists and social workers who have the understanding and expertise of their needs and challenges.
- Increase investment in research focused on AYA cancer to improve clinical outcome (by piloting clinical trials specific to AYA cancer & improve enrollment of AYA patients on available clinical trials), understand the biology of AYA cancers and address their unique psychosocial needs.
- Improve access to fertility preservation services.

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Question & Answer