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DIRECTORATE-GENERAL FOR RESEARCH AND INNOVATION

Directorate D – People
D.2 – Health Innovations & Ecosystems

6 October 2023
Thon Hotel EU
Rue de la Loi 75, 1040 Brussels, Belgium

Workshop on the environmental determinants of childhood and adolescent cancer

This European Commission workshop brings together experts in the field of environment and childhood cancer research and innovation to define in concrete terms the needs and challenges of this underdeveloped, interdisciplinary research field. It is also designed to foster interactive discussions between researchers and innovators as well as provide valuable input to EU policymakers and funders.

The main aims of this workshop will be to:

1. Highlight and make visible the current state of play on the links between environmental risk factors and childhood cancer.
2. Determine the main priorities, gaps and needs for research in the field of environment and childhood cancer in the years to come.

Background

Cancer is a complex multifactorial disease, with genetic factors and environmental determinants such as viruses, bacteria, radiation, nutrition and chemicals all playing a role in the risk of developing cancer. It is estimated that up to 90% of cancer cases in adults are thought to have their roots in the environment and lifestyle^{1,2}, while less is known about the potential role of environment in childhood cancers.

Cancer is a leading cause of death for children and adolescents³. Each year there are 35 000 new cases of cancer in children and adolescents in Europe (15 000 in children below the age of 15 years and 20 000 in those aged 15-24) and more than 6 000 young people die of cancer. There are an estimated 500 000 European childhood cancer survivors: two thirds of them suffer from late side

¹ E.g., [Nature 2016 Jan 7;529\(7584\):43-7](#)

² [Pharm Res. 2008 Sep; 25\(9\): 2097–2116](#)

³ [Key facts on childhood cancer \(who.int\)](#)

effects of treatment that are severe and half of those affected have their daily lives impacted significantly⁴.

The most frequent childhood cancers are leukaemia, tumours of the central nervous system (CNS), lymphomas and neuroblastomas. Five-year survival rates exceed 80% for children with cancer in high-income countries (HICs) globally but are less than 30% in lower-middle-income countries (LMICs). Furthermore, data collected from over 100 patient registries in over 60 countries suggests that the incidence of childhood cancer is increasing in our society⁵.

In adults, environmental, occupational and lifestyle-related risk factors, such as smoking, obesity, lack of exercise, unhealthy diet, alcohol and pollution (e.g., air, water and soil pollution, exposure to carcinogens in the workplace) play an important role in many types of cancer^{6,7}. Review studies such as that published by the European Environment Agency⁸ in 2022 highlight the role of environmental pollution (including the occupational environment) in cancer. The role of air pollution as a risk factor for cancer has been investigated both in adults and children^{9,10}.

Lifestyle factors usually take many years to influence cancer risk, and therefore are not thought to play a significant role in childhood cancers¹¹.

An estimated 10-14% of childhood cancers are driven by genetics^{12,13}. There are indications that some environmental factors such as radiation may play a role¹⁴, but mechanisms and cause-effect relationships are not well established, including (genetic) susceptibility at certain life stages. For example, the most frequent cancer in children, acute lymphoblastic leukaemia (ALL), has been shown to start *in utero*^{15,16,17}, whereas the role of infections and the immune system requires more research.

Why this workshop

The objective of this workshop is to explore the evidence available on the role of environmental stressors in the development of childhood cancer and reflect on existing research gaps and future needs in this research area.

⁴ [The SIOPE Strategic Plan: A European Cancer Plan for Children and Adolescents \(siope.eu\)](https://www.siope.eu)

⁵ [Lancet Oncol. 2017 Jun; 18\(6\): 719–731](https://doi.org/10.1016/j.lanc.2017.05.021)

⁶ E.g., [WHO Factsheet on Cancer \(who.int\)](https://www.who.int/cancer/factsheet)

⁷ E.g., [Cancer and air pollution \(uicc.org\)](https://www.uicc.org/cancer-air-pollution)

⁸ [Exposure to pollution causes 10% of all cancer cases in Europe \(eea.europa.eu\)](https://www.eea.europa.eu/en/topics/air/cancer)

⁹ [CA Cancer J Clin.: 10.3322/caac.21632](https://doi.org/10.3322/caac.21632)

¹⁰ [Environ Epidemiol. 2023 Aug; 7\(4\): e265](https://doi.org/10.1093/aje/kwz285)

¹¹ [Five things to know about childhood cancer | Research and Innovation \(europa.eu\)](https://www.europa.eu/en/health-topics/childhood-cancer)

¹² [Current Opinion in Pediatrics 2017 Dec; 29\(6\): 629-633](https://doi.org/10.1007/s12098-017-0629-6)

¹³ [Front Oncol. 2020; 10: 590033;](https://doi.org/10.3389/fonc.2020.00033)

¹⁴ [Cancer in Children and Adolescents | Factsheet \(cancer.gov\)](https://www.cancer.gov/factsheet/cancer-in-children)

¹⁵ [Curr Treat Options Oncol. 2022 Apr;23\(4\):543-561](https://doi.org/10.1200/JCO.2021.41.21.3543)

¹⁶ [Annu Rev Genomics Hum Genet. 2019 Aug 31;20:241-263.](https://doi.org/10.1093/ajmg/a.38142)

¹⁷ [Am J Med Genet A . 2017 Apr;173\(4\):1017-1037. doi: 10.1002/ajmg.a.38142](https://doi.org/10.1002/ajmg.a.38142)

Cancer places an immense pressure on European health systems, representing a major and growing societal challenge. In 2022, 2.7 million people in the EU-27 were diagnosed with cancer, while 1.3 million died from the disease¹⁸. This number will increase due to various factors such as the ageing, unhealthy lifestyles, unfavourable health determinants, and environmental risks such as increasing levels of pollution.

The EU Framework Programmes for Research and Innovation have funded some research on the environmental causes of cancer, mostly in adults, since the Fifth Framework (1998-2002). However, only a few research projects have addressed childhood cancer.

The [Horizon Europe Mission on Cancer](#) foresees a comprehensive mission approach by integrating research, public health and other policies. This includes citizen engagement to achieve, jointly with Europe's Beating Cancer Plan, an ambitious goal of improving the lives of more than 3 million people by 2030 through prevention and cures, and for those affected by cancer (including their families) to live longer and better. Childhood cancer, representing one of four Cancer Mission transversal priorities, is addressed across its four main objectives *Understanding, Prevention and early detection, Diagnosis and treatment and Quality of life*.

Possible research avenues to be explored include understanding the cause-and-effect relationships between environmental factors and childhood cancers (including further evidence gathering to resolve currently conflicting data), and, on the basis of this, propose interventional studies and preventive actions.

Final agenda

09:00-09:30 **Welcome and Registration**

09:30-10:20 **Session 1: Policy context**

- [Horizon Europe Mission on Cancer](#)
Joanna Drake, Cancer Mission Manager & Deputy Director-General
DG Research and Innovation (European Commission)
- [Europe's Beating Cancer Plan](#)
Christine Redecker, Policy Officer, DG Health and Food Safety
(European Commission)
- [Zero Pollution Action Plan](#)
Veronica Manfredi, Director for Zero Pollution, DG Environment
(European Commission)
- [European Centre for Environment and Health](#)
Francesca Racciopi, Head of Office, European Centre for Environment
and Health (WHO/ECEH)

¹⁸ [European Cancer Information System \(ecis.jrc.ec.europa.eu/\)](https://ecis.jrc.ec.europa.eu/)

10:20-10:50	<p>Keynote address: The causes of childhood cancer</p> <p>Sir Mel Greaves, Founding Director, Centre for Evolution and Cancer, Institute of Cancer Research (United Kingdom)</p>
10:50-11:20	<p>Coffee break</p>
11:20-12:30	<p>Session 2: Setting the scene: key initiatives providing evidence for the link between environmental stressors, childhood and adolescent cancer</p> <ul style="list-style-type: none"> • <i>“Childhood cancer research at the International Agency for Research on Cancer”</i>: Joachim Schüz, International Agency for Research on Cancer (IARC/WHO) • <i>“A new large-scale cohort to study the influence of the exposome on childhood cancer and other diseases - FILOMENE couple child cohort”</i>: Remy Slama, Institut national de la santé et de la recherche médicale – INSERM (France) • <i>“European Cancer Inequalities Registry (ECIR)”</i>: Magdalena Stepień, Joint Research Centre (European Commission) • <i>“European Reference Network on Paediatric Cancer (ERN PAEDCAN)”</i>: Ruth Ladenstein, St. Anna Children’s Hospital (Austria) • <i>“Protecting our children from the effects of pollution”</i>: Ian Marnane, European Environment Agency (EEA)
12:30-12:45	<p>Building on past EU funded research on environment and childhood cancer (Results of the outcomes of the Horizon Results Booster analysis)</p>
12:45-14:00	<p>Lunch</p>
14:00-15:00	<p>Session 3: Thematic session 1: Chemical exposures and childhood and adolescent cancer</p> <ul style="list-style-type: none"> • Rebeca Ramis, Instituto de Salud Carlos III • Remy Slama, Institut national de la santé et de la recherche médicale – INSERM • Jacqueline Clavel, Institut national de la santé et de la recherche médicale – INSERM • Tim Nawrot, University of Hasselt
15:00-16:00	<p>Session 3: Thematic session 2: Physical exposures and childhood and adolescent cancer</p> <ul style="list-style-type: none"> • Maria Feychting, Karolinska Institutet • Astrid Coste, Centre Léon Bérard à Lyon

- Corinne Mandin, Institut de Radioprotection et de Sûreté Nucléaire – IRSN
- Joachim Schüz, International Agency for Research on Cancer (IARC/WHO)

16:00-16:15

Coffee break

16:15-17:15

Session 3: Thematic session 3: Other environmental factors (including lifestyle factors) and childhood and adolescent cancer

- Friederike Erdmann, University Medical Center of the Johannes Gutenberg University Mainz
- Giorgio Tettamanti, Karolinska Institute
- Eva Steliarova Foucher, International Agency for Research on Cancer (IARC/WHO)
- Audrey Bonaventure, Institut national de la santé et de la recherche médicale – INSERM

17:15-17:30

Closing session and next steps

Irene Norstedt, Director, People Directorate, DG Research & Innovation (European Commission)