Childhood cancer: do we have enough evidence to act for prevention?

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What is the question to be addressed?

The objective is to make you think, not only about scientific questions but about how science is constructed, carried out, published, and finally ignored or utilized for purposes not limited to curing diseases, such as childhood cancers. Many questions are not asked, or are selected out not to be answered, because not knowing is more comfortable than knowing and deciding to ignore results which may indicate a serious threat to life of children and the population at large when these threats implicate huge financial interests; in other words when knowledge may save a few unimportant persons such as innocent kids but can at the same time impede a tiny proportion of the leaders of this world to make rather large benefits.

Our environment has been changed by vast numbers of new chemicals and types of radiation that are virtually untested for long-term carcinogenesis – especially as mixtures. When evidence appears to suggest a health problem, both industry and governments generally do not want to know. When Authorities do try to take action we have companies legally challenging decisions. Following the classification of glyphosate in 2015 as probably carcinogenic to humans (Group 2A) by the International Agency for Research on Cancer (IARC), IARC has been the target of an unprecedented number of orchestrated actions by industrial and commercial stakeholders seeking to undermine its credibility. Sitting at my desk, hearing in the distance the sound of the ocean, I dare to think some will consider that we do need to attract immediate attention to a most urgent and crucial problem; namely childhood cancer and what needs to be done about it.

Cancer in childhood and adolescence

Cancer in childhood and adolescence is increasing in many countries. For example in Europe, the IARC published that cancer incidence rates in children and adolescents have been regularly going up in a modest, almost undetectable, yet consistent trend at a pace of 1 to 2 % per year for the past decades. What do we see, if and only if, we look hard and not turn our heads to avoid the disturbing picture? Crude case numbers are used by policy makers and administrators who have to forecast resources needed to take care of these sick children and adolescents. Politicians love to cite these figures because this is all they care to understand and big numbers sound great. Yet, this will be of no help whatsoever to truly understand what is going up in our societies. The analysis of trends is a delicate epidemiological and statistical exercise and in any event will always remain a purely descriptive, albeit much needed exercise but should never in isolation be used to carry out a formal assessment of causality.

Another explanation will almost automatically be advanced. It became ritual to state: "Yes, we see more cancer cases, but it is because the population is getting old and the larger the number of old people in a population, the higher the number of cases as cancer may in part be described as mostly a disease of aging. May I remind the reader that we are dealing with children and adolescents, as a new species of canaries in the mines of our arcane world. Children and adolescents nowadays are not older than they were 50 years ago. Kids are still usually born after a pregnancy of 9 month duration and if anything they are rather born younger than older as we unfortunately see rising trends of prematurity in obstetrics. Once born, the kids may age at the speed as they did in the past, even though I think it would not be unrealistic to argue that kids are aging faster from a biological point of view than they did before. Again I will mention some phenomena which are recognized or at a minimum acknowledged by mature, seasoned scientists and compassionate doctors who still take the time to talk to their patients and really listen to them. This reminds me of a poem from Goethe telling something like: "What is the most difficult thing to do? It is to watch with our eyes what is put under our eyes. This is indeed what you think is easiest." So in slightly different words: what is the most difficult? It is indeed what you think is easiest or seems to be: seeing with our eyes what is right in front of our eyes. Have we all become blind?

How can we tackle the issue of childhood cancer? The Sasco CaRedas concept

This corresponds to a concept of "trinity" I developed with African and European colleagues in 2009 but could never find any organization, public or private, French, European or American, to fund, even on a pilot scale in two African and two European countries (Sasco, 2009). The CaRedas project was and still is to study:

- 3 groups of childhood and adolescent cancers:
  - Tumours of embryonic origin
  - Tumours linked to infectious agents, already clearly identified
  - The other tumours, not clearly belonging to the two above-mentioned groups
- 3 groups of "causes":
  - Genetic causes
  - Behavioural factors, either from the child or adolescent her or himself, or from the parents, be it pre or post-conception of the offspring, as well as following birth
  - Environmental factors

Cancer is always multifactorial. The objective is to quantify different attributable fractions according to the three groups of cancer. My a priori Bayesian hypothesis is the following:

*Genetic causes will be mostly active on the embryonic tumours. Still, there will be a modifying effect for parental and child behavioural factors and most importantly for environmental ones.
*Infectious "causes" are perfectly known for some cancer sites (adenocarcinoma of the liver and Hepatitis B and C Viruses, nasopharyngeal carcinoma and Burkitt lymphoma and Epstein-Barr Virus, etc). Yet, again the risk will be modulated by behavioural and environmental factors.

- 3 prevention strategies:

* Genetic prevention: the discovery and functionality of crisp scissors and the like make researchers dream of a greener future. Will we ever be there and is it desirable, in particular for prevention?

* Behavioural prevention: it is crucial to start with the parents. Greatest care should be taken not to victimize them and make them feel utterly guilty. The same applies to the children.

* Environmental prevention: this clearly is the route to go. The difficulty but also the opportunity is that it does not rest on the parents, nor on children and adolescents, but.is in the hands of local; national, European and world politics.

Conclusion

The answer to the question in the title rests on evaluation of scientific evidence but cannot be purely scientific, medical, economic or political. The answer must be ethical. As Hippocrates wrote it around 400 BC: *"Primum non nocere!"*

Acknowledgments

Thanks to Livio, Haize, Eva Fleur, Denis, Ahmet, Mehmet, Nadia, Serge, David, Christine, René, Joseph, Rina, Devra, Alfred, Mihail, Xavier, Elisabeth, Dominique, Lyvio, Gilles, Anne-Marie, Ludovic, Marie-Antoinette, Maria, Marc, Jean, Claudia, Roger, Silouana, Coralie, Albert and Marie, Marie Jeanne and Henri, Pierre and Jeanne, Catherine and Marcel, Dominic and Paulette, Nicolae and Monica, Anne-Corinne and Mathieu, Adrian and Alexandra, Philippe and Nicole, Philippe and Elianthe, Pierre, Claude and Daniel, B, Y, G, M, G/D for being or having been in different ways in my life and making it possible for me to keep on fighting for the health of the planet and its populations!