UTILIZATION OF QUANTITATIVE CANCER RISK ASSESSMENT TO ASSIST DECISION MAKING ON PUBLIC HEALTH AND POPS EXPOSURE

Hassig DL

Cancer Action NY; P O Box 340, Colton, New York, USA 13625;
315.262.2456; donaldhassig@gmail.com

Introduction:

Existing scientific knowledge on the subjects of persistent organic pollutants (POPs) exposure and quantitative cancer risk assessment is sufficient to support the provision of public health educational outreach on the subject of POPs exposure reduction. Government public health entities are currently failing to provide such educational outreach. Advocacy for governmental educational outreach programs on the subject of POPs exposure reduction is warranted.

Materials and Methods:

This paper was created as a result of becoming knowledgeable on the subjects of quantitative cancer risk assessment and POPs exposure. The process of developing that knowledge depended in large part upon having internet access to the scientific research literature and governmental reports addressing these subjects.

Results and Discussion:

Beginning in the early 1900s, the entire biosphere has gradually become contaminated with persistent organic pollutants (POPs). POPs are persistent, man-made, toxic substances. Many of the POPs are classified as know to cause cancer in humans or reasonably anticipated to cause cancer in humans.

POPs are contaminants of all animal fat. Exposure takes place largely through consumption of animal fat. All humans bear a body burden of POPs. This has been the case for several generations. Gestational exposure has taken place repeatedly, creating a current generation that has been shaped to a considerable extent by whatever genetic and morphological changes are imposed by gestational POPs exposure. In animal studies gestational POPs exposure predisposes offspring to increased cancer susceptibility. It is reasonable to suspect that gestational POPs exposure contributes to the breast cancer cases that are now being diagnosed in girls throughout the United States. Breast cancer in the 14 to 19 year old age group is a new phenomenon. Additionally, consecutive generations of gestational POPs exposure is a new phenomenon.

Governments around the world have failed to warn their citizens of the POPs contamination problem. This has happened because of the tremendous amount of influence that corporations exert over government. The corporate polluters will not allow government public health agencies to inform the public about POPs contamination of the food supply and the damages to heath that are associated with POPs exposure. Government environmental health agencies have produced quantitative cancer risk assessments for a few of the POPs. A quantitative cancer risk assessment is a document that describes the use of epidemiological research findings to develop estimates of how much cancer is caused by exposure to various quantities of a carcinogen. Cancer incidence in low, medium and high

exposure groups is plotted against the quantities of exposure. The slope of the line that best approximates this data is called the cancer slope factor. The cancer slope factor is a number that describes the amount of cancer caused by a unitary quantity of exposure to the carcinogen. Multiplying the quantity of exposure by the cancer slope factor yields an estimate of the amount of cancer risk imposed by that particular quantity of exposure.

The US EPA has developed a process for making available to the public the limited risk information. EPA's Integrated Risk Information System (IRIS) is accessible on the agency's web site.

Very little scientific knowledge exists upon which to base quantitative cancer risk assessments for the vast majority of POPs. It is not possible at the current state of scientific knowledge to produce quantitative cancer risk assessments for all of the POPs that one is exposed to as a result of animal fat consumption. Thus, POPs exposure imposes an unknown quantity of cancer risk. However, by simply taking into account the quantity of cancer risk that is imposed by exposure to those POPs for which quantitative risk assessments exist it is clear that more than an acceptable amount of cancer risk is imposed by total POPs exposure.

Dioxin exposure cancer risk has been quantified by US EPA in Part III of the Agency's 2003 draft dioxin reassessment. 1 This risk is greater than 1 in 1000 for current background levels of exposure. However, due to the EPA's failure to finalize the draft dioxin reassessment, no quantitative cancer risk assessment information for dioxin is available through the IRIS program. Greater than 1 in 1000 is an unacceptable quantity of cancer risk. Quantitative cancer risk assessments have been produced by IRIS for several of the POPs, including: Chlordane, DDE, DDT, Dieldrin, Hexachlorobenzene, alpha-Hexachlorocyclohexane and Toxaphene. The oral exposure cancer slope factors for these substances are provided below. Multiplying the quantity of exposure by the cancer slope factor produces an estimate of cancer risk.

Chlordane 3.5 x10-1 per mg/kg-day
DDE 3.4 x10-1 per mg/kg-day
DDT 3.4 x10-1 per mg/kg-day
Dieldrin 1.6 x10-1 per mg/kg-day
Hexachlorobenzene 1.6 per mg/kg-day
alpha-Hexachlorocyclohexane 6.3 per mg/kg-day
Toxaphene 1.1 per mg/kg-day

In order to calculate the cancer risk imposed by exposure to each of the substances listed above it is necessary to determine how much exposure is taking place on a daily basis. Analysis of animal fat foods for POPs contaminants is the process that generates the basic exposure data needed. However, such testing is not being conducted to the extent that reliable data is available.

No scientific knowledge exists on the subject of synergies that cause multiple POPs exposure to impose more than an additive quantity of cancer risk. Simply adding the cancer risk for those POPs that have been assessed is likely to produce an underestimate of actual cancer risk.

The only reasonable course of action open to public health departments is warning the public of the significant and yet unquantifiable cancer risk imposed by the POPs exposure resultant from animal fat consumption. The United Nations' Safe Planet Campaign has begun to educate citizens of the world on

the subject of POPs body burden. Hopefully, Safe Planet will soon begin to set before the public the facts of POPs in the food supply and the unacceptable quantity of cancer risk that this contamination imposes.

Advocacy for provision of POPs exposure reduction educational outreach programs by national and regional government health entities is very much needed at this time. Without such advocacy, government health entities will continue to avoid the POPs exposure issue and the public will continue to consume animal fat at unsafe levels due to lack of knowledge concerning POPs exposure cancer risk.

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References:

1. U S Environmental Protection Agency. (2003 Draft) "Exposure and Human Health Reassessment for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin and Related Compounds". www.epa.gov