

Consequential Epidemiology and Children's Cancer

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Evidence is accumulating on the environmental risk factors for childhood leukemia. Risk factors including tobacco smoke, pesticide exposure (both residential and occupational in the parents), solvents, and traffic related air pollution have been examined in well designed case control studies. Consistent increases in risk have been identified in pooled and meta-analyses combining data from thousands of cases and controls. In addition, several factors have consistently been identified as reducing risk including; Adequate folate consumption/quality diet, attendance in daycare (marker for exposure to common childhood infection), and breast feeding for at least 6 months.

Why is it that activities to reduce childhood leukemia have not been incorporated into cancer prevention programs when potentially modifiable risk factors have been identified? Recently, our research group has suggested that the time is right to develop activities focused on primary prevention of childhood leukemia. Parents and communities feel it is their right to have accurate information on risks and actions that might potential reduce them. It is important to identify causes of childhood cancer but also to go further to reach people and decision makers by embracing translation and implementation sciences. Our ultimate goal should be to prevent childhood leukemia and other diseases.

It is prudent to initiate programs designed to alter exposure to well-established leukemia risk factors rather than to suspend judgment until no uncertainty remains if the goal is to protect children's health. Primary prevention programs for childhood leukemia would also result in the significant co-benefits of reductions in other adverse health outcomes that are common in children, such as detriments to neurocognitive development (see table below). Examples from the CIRCLE program's science and outreach/translation will be presented.

Resource: Whitehead TP, Metayer C, Wiemels JL, Singer AW, Miller MD. Childhood Leukemia and Primary Prevention. *Curr Probl Pediatr Adolesc Health Care* 2016;46:317-352– open access <https://www.sciencedirect.com/science/article/pii/S1538544216300694>

(table below adapted from paper)

Many materials from our group are available at: <http://circle.berkeley.edu>

A Story of Health. Multimedia e-book for clinicians explores how environments interact with genes to influence health across the lifespan. Includes chapter on childhood leukemia. Free Continuing Medical Education credits available from the CDC (<http://coeh.berkeley.edu/ucpehsu/soh.htm>)

Exposures associated with altered risk (increased or decreased) for developing childhood leukemia and examples of co-benefits of improved health outcomes by clinical and public health actions (US examples):

Exposure	Health Impacts other than Childhood Leukemia	Clinical Recommendations	Public Health Activities
Pesticides	Neurobehavioral disorders, asthma, adverse birth outcomes, adult cancer, reproductive toxicity	AAP recommends Integrated Pest Management (IPM), exposure reductions. Advocates clinicians become familiar with acute and chronic/subclinical effects and provide anticipatory guidance	IPM recommended by US EPA and cooperative extension services Pesticides registered with EPA reviewed for health effects
Tobacco	Respiratory disease and asthma, adverse birth outcomes, cardiovascular disease, adult cancers, neurocognitive disorders, SIDS	Smoking cessation, avoidance of secondhand smoke universally recommended	National and local tobacco control programs, cessation hotlines Education campaigns about second hand and third hand smoke and children
Air Pollution (including traffic related)	Includes: Preterm birth, decreased birth wt., asthma and respiratory development, cardiovascular dis., neurobehavioral disorders	Less amenable to individual action. Recommendations to restrict outdoor activities during high air pollution days (AirNow.gov). Avoid wood fires.	Many state and federal programs for air pollution reduction. Local programs to encourage walking and biking. No idle zones, replacement of old diesel vehicles. School siting regulations.
Folate (risk reduction) supplementation / healthy diet	Inadequate folate early in pregnancy associated with neural tube defects, increase in autism risk, other birth defects	Preconception or prenatal folate supplementation recommended by ACOG and AAFP and others	Fortification or Supplementation recommended by US Preventive Services Task Force, WHO, etc.
Breastfeeding (risk reduction)	SIDS, diarrhea, bacteremia, otitis media, childhood obesity, respiratory infection	Promote breastfeeding as the norm, develop skills to assess and collaborate with obstetrical community and certified counselors, serve as advocates for breastfeeding	2011 Surgeon General's Call to Action to Support Breastfeeding: Actions for NGOs, government, employers, etc. All states have breastfeeding coalitions, programs to promote and support breastfeeding in minority communities