To: Marin County Board of Supervisors
From: Dr. Michelle Perro, MD
Date: November 26, 2013

Re: Marin County Department of Agriculture 10-Year Weed Plan & Dr. DiTomaso's November 7th, 2013 Response to MOMAS' Oct. 28th Comments

My position as a Marin-based Integrative Pediatrician with over 33 years of experience has provided me the opportunity to understand the health of our children on a clinical level. What I have been lecturing about for the past ten years is the profound decline in our children's health. Using the example of Autistic Spectrum Disorder, we are now experiencing an epidemic with the diagnosis hovering at 1:50 children being diagnosed. A myriad of chronic diseases have emerged which are causing serious concern in the pediatric community, including asthma and other atopic diseases, endocrine disorders, thyroid disease, autoimmune disorders, neurologic dysfunction and most commonly, digestive issues.

Through my involvement with children's health, I have become increasingly concerned regarding the use of pesticides, which have been shown to have negative effects on children's health. Upon learning of the desire to spray using aminopyralid (Milestone®) and clopyralid (Transline®) locally in Marin County, I researched the health ramifications of these herbicides. In addition, I reviewed a recent response by Joseph DiTomaso dated November 7, 2013 addressed to Marin County's Department of Agriculture (through UC Extension's David Lewis).

Pesticides have been shown to cause ADHD, decreased cognitive function, low motor tone at birth and endocrine disruption in children and their mothers. This has been shown in the work of Brenda Eskenazi from UC Berkeley School of Epidemiology, (CHAMACOS study) in the Salinas Valley for the past 12 years. (Prenatal Exposure to Organophosphate Pesticides and IQ in 7-year-old Children, Bouchard MF, Chevrier J, Harley KG, Kogut K, Vedar M, Morga N, Trujillo C, Johnson C, Bradman A, Barr DB, Eskenazi B. Environ Health Perspect. 2011 Aug;119(8):1189-95. PON1 and Neurodevelopment in Children from the CHAMACOS Study Exposed to Organophosphate Pesticides in Utero,Eskenazi B, Huen K, Marks A, Harley KG, Bradman A, Barr DB, Holland N. Environ Health Perspect. 2010;118:1775-1781, Eskenazi B, Huen K, Marks A, Harley KG, Bradman A, Barr DB, Holland N. Environ Health Perspect. 2010;118:1775-1781Eskenazi B, Huen K, Marks A, Harley KG, Bradman A, Barr DB, Holland N. Environ Health Perspect. 2010;118:1775-1781).

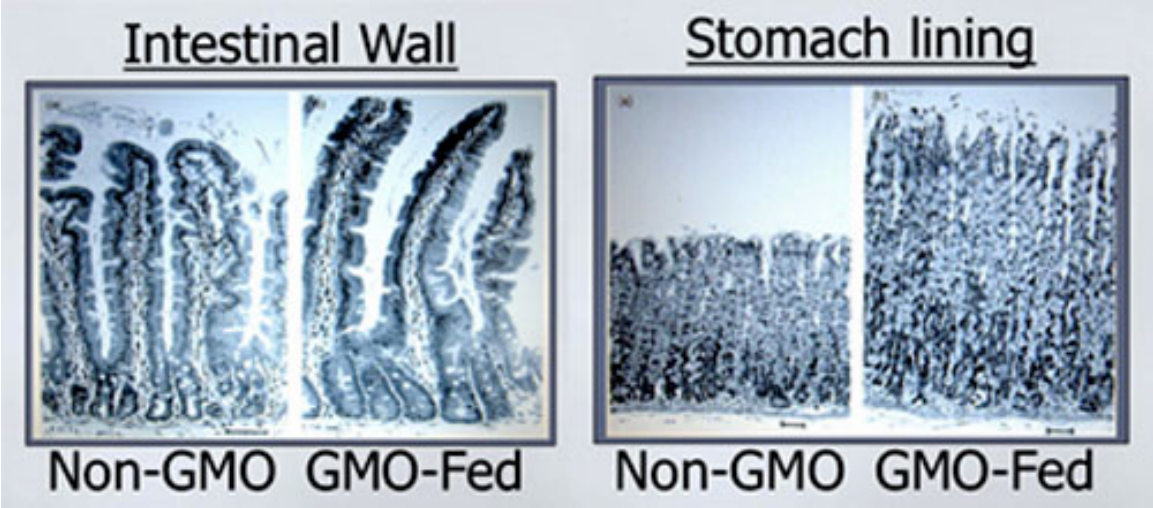
What Dr. Eskenazi reveals is that many children lack certain enzymes that cannot detoxify various agrochemicals. These toxic effects were studied *after* the organophosphates were introduced into our food supply. Similarly, it is concerning that there are no human studies reported on either of the proposed herbicides – and notably, no studies directly on point regarding how the proposed herbicides impact the health of children.

However, when reviewing animal studies on aminopyralid, note the following: "Hazard Identification – The mammalian toxicity of aminopyralid is relatively well-characterized in experimental mammals in a series of toxicity studies that are required for pesticide registration. In standard experimental toxicity studies in rats, mice, rabbits, and dogs, aminopyralid has low acute and chronic oral toxicity. It seems reasonable to

assume the most sensitive effects in wildlife mammalian species will be the same as those in experimental mammals (e.g., changes in the gastrointestinal tract, weight loss, and incoordination)." (Prepared by Syracuse Environmental Research Group for the USDA Forest Service and National Park Service; http://www.fs.fed.us/foresthealth/pesticide/pdfs/062807_Aminopyralid.pdf).

In the evaluation of aminopyralid, there is clearly gut pathology in dogs which showed both abnormal and hyperplastic growth. (Mullin LS. 1987. Subchronic Oral Toxicity: 90-Day Study with TIPA Feeding Study in Dogs. Medical Research Project No. 8086-001. E. I. du Pont de Nemours and Company, Inc., Haskell Laboratory for Toxicology and Industrial Medicine, Newark, Delaware. As summarized in Stebbins and Dryzga 2004 MRID 46235622).

This same finding was first found at the initial investigation of glyphosate (discussed below) in 1996 by Arpad Pusztai at the Rowett institute.



These findings were ignored. Since bringing this herbicide into the children's food supply, the rate of digestive disease has skyrocketed and clinical diagnoses of intestinal permeability and subsequent food allergies can be extrapolated from the rat studies. There are no human studies to corroborate this.

As for aminopyralid, "Effects have been noted in the stomach of both dogs (Stebbins and Baker 2002; Stebbins and Day 2003a) and rabbits (Marty et al. 2002). In rabbits, effects in the stomach are characterized as erosions or ulcers of the glandular mucosa. These effects were seen in only 2 of 26 females at the highest dose of technical grade aminopyralid that was tested – i.e., 750 mg a.e/kg bw (Marty et al. 2002). This effect was not seen in the rabbit developmental study with the TIPA salt of aminopyralid (Carney and Tornesi 2004b). In dogs, frank stomach lesions have not been noted. Instead, the only observed effect is hyperplasia and hypertrophy at dietary concentration of 30,000 ppm for 13 weeks in male and female dogs (Stebbins and Baker 2002) and hyperplasia and hypertrophy of the stomach mucosa with slight inflammation in male (967 mg a.e./kg bw/day) and female (1030 mg a.e./kg bw/day) dogs after one year (Stebbins and Day 2003a)." (Syracuse Environmental Research Group, 2007). **These are the same findings noted in the above histopathology slides above.**

Other concerns regarding aminopyralid and potential health hazards include:

1. Runoff from spraying as high as 5% in clay soils with soil contamination and alteration of soil microbes.
2. Fish studies show loss of equilibrium (neurotoxicity) and incoordination in other animal studies.
3. Intestinal damage to the cecum (cecal enlargement) in rabbits.
4. High concentrations of aminopyralid in goat kidneys than other organs. Other weak acid herbicides that are structurally similar to aminopyralid may damage both the liver and kidney – e.g., picloram (SERA 2003a), triclopyr (SERA 2003b), clopyralid (SERA 2004c), and 2,4-D (SERA 27 2006a).
5. Severe eye irritant in rabbits, etc.

I also question findings of Joseph Di Tomaso from the Department of Plant Sciences, UC Davis. Dr. Di Tomaso reports in his letter to the Marin County Department of Agriculture regarding glyphosate (RoundUp®) that "RoundUp Toxicity is sensationalized, unscientific and out of context..." Unfortunately, this is not the case. The work of Seralini, et al, accepted by the E.U., has reported gastrointestinal, immunological as well as other health consequences in research spanning several years in rat studies. Seralini has expanded on the original work noted above. It is important to note that although glyphosate was also not studied in humans prior to its introduction, its use has increased tremendously over the past two decades http://www.nlpwessex.org/docs/benbrook.htm.

I have included 48 pages of published literature on the toxicity of glyphosate via this link: http://www.greenmedinfo.com/sites/default/files/free_downloads/gpub_78151_toxic_ingredient_glyphosate_formulations.pdf.

The EPA in its Third Edition of 'America's Children and the Environment', January 2013, regarding glyphosate, "Previous safety assessments have concluded that glyphosate does not affect fertility or reproduction in laboratory animal studies. However, more recent studies in laboratory animals have found that male rats exposed to high levels of glyphosate...may suffer from reproduction problems, such as delayed puberty, decreased sperm production and decreased testosterone production. Very few epidemiological human studies have investigated effects of glyphosate exposure on reproductive endpoints."

What we can learn from this is that another herbicide was brought into use commonly in the United States without any human evaluation, and promised to be 'safe'. After the fact, we are finding that the rapid introduction of toxic chemicals without rigorous scientific inquiry has produced likely life-long health challenges in our most vulnerable population. Animal findings have paralleled our own clinical findings in children with the regarding testosterone production. The EPA report contradicts Mr. Di Tomaso's assumptions. It is well known that reproductive health has declined and in-vitro fertilization rates are staggering. (Stephen E, et al, Declining Estimates of Infertility in the U.S.: 1982-2002. Fertility and Sterility, 2006;86(3):516-523).

The matter of 'inert' ingredients in these herbicides should also be clarified. According to some authors, the toxicity of the inert substances may be more potent that the herbicide itself and they have been shown to enhance the toxic effect. Dr. Di Tomaso also states in his letter that the inert ingredients show no effect; "Like the active ingredient itself, formulations are also evaluated for toxicity, and both herbicides (Milestone and

Transline) showed no effects". This sentiment has also been expressed regarding other herbicides, such as glyphosate. We know that is not the case. I have included the references below; please note the work of Richard, 2005 regarding adjuvants and toxicity for a further understanding of this issue.

Regarding aminopyralid, “Information on manufacturing processes, inerts, and impurities in aminopyralid and aminopyralid formulations has been submitted to the U.S. EPA (Ghaoui 2004; Jensen 2004a). These submissions are classified as Confidential Business Information (CBI) and are not eligible for release under the Freedom of Information Act (FOIA). (Syracuse Environmental Research Group, 2007). There is no accessible data regarding the inert substances in aminopyralid. Therefore, one cannot validate the safety of this herbicide at least until this information is available to the public for review.

In summary, the premature entry of chemicals into the environment without sufficient scientific study has been shown to be detrimental to the well being of our children. Prior to introducing the proposed herbicides Milestone and Transline, human studies must be provided. Until that time, non-toxic alternatives must continue to be prioritized and explored.

Michelle Perro, MD

Glyphosate/Roundup research from Séralini and team

Seralini 2012: NK603 maize and roundup study

Benachour 2009: Roundup causes cell death

Benachour 2007: Roundup toxic to embryo cells

SciAmer 2009: Weed-whacking herbicide deadly

Richard 2005: Roundup adjuvants enhance toxicity

Mesnage 2010 bk: Roundup in GM plants toxicity

Clair 2012: Roundup affects useful food microorganisms

Clair 2012 Tox: Roundup toxic to testicular cells

Defarge 2012: Roundup developmental and reproductive toxicity

Mesnage 2012: Glyphosate exposure in farm family

Gasnier 2009: Glyphosate herbicides endocrine disruptors

Gasnier 2011: Plant extracts protect against toxics

Gasnier 2010: Plant extract protects against Roundup

Mesnage et al. 2012: Toxicity of Roundup adjuvants

Scientific debate between Séralini and critics

Seralini 2012: Séralini answers critics

Hammond 2012: Monsanto response to Séralini

Heinemann response to Seralini critics

2012 ENSSER: Comments on Séralini study

2012 Scientists Support Seralini 1

2012 Scientists Support Seralini 2

2012 The double standards of EFSA

2012 EFSA: Double standards press release

desouza 2012: AnBio response to Seralini

Other research

Mesnage 2010: Pesticide exposure and birth defects

Hammond 2006: Monsanto rootworm-resistant maize study

Hammond 2006: Monsanto corn-borer-resistant maize study

Hammond 2004: Monsanto NK603 maize study