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# Pesticide Exposure and ADHD in the General Population: A School Vaccination Model and an Introduction to Integrated Pest Management for Food Establishments

Melissa Zeidler\*

## I. INTRODUCTION

Imagine your child is diagnosed with Attention Deficit Hyperactivity Disorder (“ADHD”). Certain questions probably come to mind: how can it be safely and effectively treated? How did it happen? There may be several possible answers: it could be treated by medication or behavioral therapy. Maybe it was genetic; or maybe it was caused by dinner. New studies have linked exposure to organophosphates, a particular type of pesticide, to ADHD in the general population, and the main source is believed to be dietary.<sup>1</sup>

Pesticides are substances that are used to prevent, destroy, repel or mitigate any “pest.” Pest refers to insects, mice, weeds, fungi and microorganisms.<sup>2</sup> Problems associated with pesticide exposure have typically been studied in high-exposure areas, but it appears that this focus should change to reflect the recent studies that connect organophosphates to ADHD.

Part II of this comment explores the background of the Environmental Protection Agency, its role in pesticide regulation, and the rising recognition of childhood exposure. It also discusses how courts have addressed organophosphate exposure, namely through reactive means like medical monitoring and toxic torts. Part III introduces two recent studies that suggest a link between organophosphate exposure and children with ADHD in the general population. This part also explains current medical monitoring systems for adult farm workers, and it proposes a mandatory monitoring scheme

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1. Sarah Klein, *Study: ADHD Linked to Pesticide Exposure*, CNN, May 17, 2010, <http://www.cnn.com/2010/HEALTH/05/17/pesticides.adhd/index.html>.

2. EPA, <http://www.epa.gov/pesticides/about/> (last visited Feb. 1, 2011).

for children modeled upon school vaccination laws. Part IV discusses a more proactive approach of reducing pesticide use by considering the benefits of Integrated Pest Management (“IPM”), which is a way of managing pests without relying solely on chemical pesticides.<sup>3</sup> It will compare a proposed bill in New York that would implement an IPM system for food-selling establishments with a successful IPM program in North Carolina school districts. It will also suggest ways to avoid potential statutory construction problems. Part V discusses the emerging trend of IPM food labels in grocery stores. Finally, this comment will suggest the need for more IPM legislation on food-selling establishments as ways to combat dietary exposure to organophosphates.

## II. ENVIRONMENTAL PROTECTION AGENCY AND PESTICIDE REGULATION

### A. *The Power of the Environmental Protection Agency*

The Environmental Protection Agency<sup>4</sup> (“EPA”) was created in response to growing concerns about the government’s ability to develop knowledge about, and protection for, the condition of the environment.<sup>5</sup> In suggesting the creation of the EPA, President Nixon acknowledged that some pollutants, including pesticides, appear in land, air, and water, which are referred to as “media,”<sup>6</sup> and that current agencies were designed primarily along “media” lines. President Nixon expressed apprehension about this “piecemeal” approach to environmental regulation.<sup>7</sup> He suggested that agency missions should not necessarily be designed along separate media lines, but should be more coordinated.<sup>8</sup> The EPA would be an agency which would address environmental concerns in a more systematic, comprehensive scheme.<sup>9</sup> For example, pesticide regulations that were once scattered among the Department of the Interior, the Food and Drug Administration, and the Department of Agriculture<sup>10</sup> would now be transferred to a single entity, the EPA, in part to eliminate the media-dependent focuses.<sup>11</sup>

Now that the EPA has control over pesticides, three main acts give the EPA specific authority and control: the Federal Food, Drug, and

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3. EPA, <http://www.epa.gov/pesticides/food/ipm.htm> (last visited Jan. 30, 2011).

4. U.S.C.A. Reorg. Plan 3 (1970).

5. EPA, [www.epa.gov/history/org/origins/rcorg.htm](http://www.epa.gov/history/org/origins/rcorg.htm) (last visited Feb. 1, 2011).

6. *Id.*

7. *Id.*

8. *Id.*

9. *Id.*

10. *Id.*

11. *Id.*

Cosmetic Act;<sup>12</sup> the Federal Insecticide, Fungicide, and Rodenticide Act;<sup>13</sup> and the Food Quality Protection Act.<sup>14</sup>

The Federal Food, Drug, and Cosmetic Act (“FFDCA”) authorizes the EPA to set tolerance levels of chemical residues on foods.<sup>15</sup> This means that the EPA must determine acceptable levels of pesticides and other chemicals to be present on foods.<sup>16</sup> Before being amended, the FFDCA held raw foods and processed foods to different standards: raw foods had to pass a risk-assessment analysis, while processed foods only had to meet a “safe” threshold.<sup>17</sup> To follow the risk-assessment analysis for raw foods, the EPA balanced the benefits of using a particular pesticide with its health risks.<sup>18</sup> In implementing the “safety” threshold for processed foods, the EPA prohibited the application of any additives found to induce cancer.<sup>19</sup>

The Federal Insecticide, Fungicide, and Rodenticide Act (“FIFRA”) authorizes the EPA to register pesticides,<sup>20</sup> and it regulates pesticide manufacture, importation, sale, and use in the United States.<sup>21</sup> Basically, FIFRA provides “pre-market clearance of pesticide products and post-market surveillance of pesticides to ensure they cause no unreasonably adverse” health effects on humans or the environment.<sup>22</sup>

#### B. *The Food Quality Protection Act Additives*

The Federal Food Quality Protection Act (“FQPA”) amended both the FIFRA and FFDCA.<sup>23</sup> The FQPA amended the FIFRA by creating a new registration process with stricter standards.<sup>24</sup> All registered pesticides are now subject to re-registration to ensure that they meet the

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12. Federal Food, Drug and Cosmetic Act, 21 U.S.C. § 301 (2006 & Supp. 2010).

13. Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 136 (2006).

14. Food Quality and Protection Act of 1996, Pub. L. No. 104-170, 110 Stat. 1489 (1996).

15. EPA, <http://www.epa.gov/pesticides/regulating/laws.htm#ffdca> (last visited Feb. 1, 2011) [hereinafter EPA website FFDCA].

16. 21 U.S.C. § 346-346a.

17. This was known as the Delaney Paradox. See Laticia M. Diaz, *Prozac or Less Pesticides?—The Link Between Juvenile Violence and Pesticide Exposure*, 2 BARRY L. REV. 19, 26 (2001) for a more in-depth analysis.

18. National Research Council Board on Agriculture, *Regulating Pesticides in Food: The Delaney Paradox*, 65 LAND ECONOMICS 272, (1989), available at <http://www.jstor.org/pss/3146269>.

19. *Id.*

20. 7 U.S.C. § 136a (2006).

21. SC27 ALI-ABA 297 (1997).

22. *Id.*

23. EPA website FFDCA, *supra* note 15.

24. Pub. L. No. 140-170 amending 7 U.S.C. § 136a.

new requirements.<sup>25</sup> Additionally, registered pesticides are also subject to review every fifteen years to guarantee that they continue to meet these new standards.<sup>26</sup>

The FQPA amended the FFDCA by creating one tolerance level: a “safe” level for both raw and processed foods.<sup>27</sup> Safe is defined as a “reasonable certainty that no harm will result from the aggregate exposure to the pesticide residue, including all dietary exposures and exposures for which there is reliable information.”<sup>28</sup> To determine whether there is a reasonable certainty of no harm, the EPA now assesses the aggregate<sup>29</sup> and cumulative risks posed by pesticide use.<sup>30</sup> The aggregate assessment requires evaluation of sources of exposure to ensure that pesticide levels are safe with regards to three exposure pathways:<sup>31</sup> dietary, drinking water, and residential uses.<sup>32</sup> The cumulative assessment requires the EPA to group and evaluate pesticides with a “common mechanism of toxicity” to better evaluate people’s actual exposure to multiple pesticides, at one time, that act the same way in the body.<sup>33</sup> Four groups of pesticides have been identified: organophosphates, n-methyl carbamates, triazines, and chloroacetanilides.<sup>34</sup> This comment focuses on organophosphates. Organophosphates are chemical insecticides that affect the nervous system by inhibiting cholinesterase in both insects and humans.<sup>35</sup> Cholinesterase is an enzyme which is necessary for proper nervous system functioning,<sup>36</sup> and low levels of cholinesterase have been linked to neurological disorders.<sup>37</sup>

In addition to these amendments, the FQPA requires the EPA to specifically examine the risks of exposure to infants and children when

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25. EPA, [http://www.epa.gov/pesticides/regulating/laws/fqpa/fqpa\\_implementation.htm](http://www.epa.gov/pesticides/regulating/laws/fqpa/fqpa_implementation.htm) (last visited Feb. 1, 2011) [hereinafter EPA website FQPA].

26. *Id.*

27. Pub. L. 104-170, § 405 *amending* 21 U.S.C. § 346a(b)(2)(A)(i).

28. Pub. L. 104-170, § 405 *amending* 21 U.S.C. § 346a(b)(2)(A)(ii).

29. *Id.*

30. EPA website FQPA, *supra* note 25.

31. EPA, <http://www.epa.gov/pesticides/cumulative/index.htm> (last visited Feb. 1, 2011) [hereinafter EPA website cumulative].

32. EPA website FQPA, *supra* note 25.

33. EPA website cumulative, *supra* note 31.

34. EPA website FQPA, *supra* note 25.

35. Ronald R. Weber, Comment, *Has the Daubert Decision Created a New “Pest” for California Farm Workers Involved in Pesticide Poisoning Litigation?*, 19 SAN JOAQUIN AGRIC. L. REV. 223, 245 (2009); Valerie Watnick, *Who’s Minding the Schools: Towards Least Toxic Methods of Pest Control in Our Nations Schools*, 8 FORDHAM ENVTL. L. REV. 73, 80 (1996).

36. Weber, *supra* note 35, at 245; Watnick, *supra* note 35, at 80.

37. Weber, *supra* note 35, at 245; Watnick, *supra* note 35, at 245.

setting acceptable tolerance levels.<sup>38</sup> This special recognition of children was influenced by a 1993 publication entitled *Pesticides in the Diets of Infant and Children* by the National Academy of Sciences.<sup>39</sup> The publication explained that children are more susceptible than adults to problems associated with pesticide exposure for four general reasons.<sup>40</sup> First, developing organs are more susceptible to dangers. Second, pound-for-pound, children drink more water, eat more food, and breathe more air than adults. Third, children's play behavior of placing objects in their mouths and being close to the ground increases exposure to trace pesticides from the outside. Finally, children may be susceptible to chronic, multi-stage diseases that may be triggered by early exposure.<sup>41</sup>

After this publication, President Clinton signed Executive Order No. 13045 in 1997 which directed each "federal agency to set, as high priority, the identification and assessment of environmental health risks and safety risks that may affect children."<sup>42</sup> To give effect to this order, the EPA published notice in the Federal Register for the purpose of reexamining "human health and environmental protection standards" to see if children were being adequately protected.<sup>43</sup>

The combination of the National Academy of Sciences publication, FQPA, and the Executive Order influenced the EPA to cancel the use of several organophosphates on "kid foods, such as apples," and influenced the EPA to "utilize a tenfold safety factor as appropriate in setting and reassessing tolerances."<sup>44</sup> This tenfold safety factor allows the EPA to be more protective of children by accounting for developmental risks and incomplete data on children and infants.<sup>45</sup>

Despite this initial wave of awareness, some issues still exist. For example, many child-specific acts were introduced into Congress but were never passed.<sup>46</sup> A related issue is that the majority of the proposed

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38. Pub. L. 104-170, § 405 amending 21 U.S.C. § 346a(b)(2)(vi).

39. ANGELA LOGOMASINI, COMPETITIVE ENTER. INST., PESTICIDE REGULATION OVERVIEW, available at <http://cei.org/sites/default/files/Angela%20Logomasini%20-%20Pesticide%20Regulation%20Overview.pdf>.

40. *Id.*

41. Review and Evaluation of EPA Standards Regarding Children's Health Protection from Environmental Risks, 62 Fed. Reg. 51854-01 (Oct. 3, 1997).

42. Exec. Order No. 13,045, 62 Fed. Reg. 19885 (1997).

43. 62 Fed. Reg. 51854-01, *supra* note 41.

44. EPA website FQPA, *supra* note 25.

45. EPA, <http://www.epa.gov/pesticides/factsheets/kidpesticide.htm> (last visited Feb. 3, 2011).

46. Children's Environmental Protection Act, S. 2179, 104th Cong. (1995-1996); Children's Protection and Community Clean Up Act, H.R. 2956, 106th Cong. (1999); Public Right-To-Know and Children's Environmental Health Protection Act, H.R. 4234, 104th Cong. (1995-1996); Children's Environmental Protection Act, S. 599, 105th Cong. (1997-1998), H.R. 2415, 105th Cong. (1997-1998); School Environment Protection Act

acts focused on pesticide applications on school grounds, rather than acknowledging that the main source of exposure is dietary.<sup>47</sup> Another issue is that the Natural Resources Defense Council determined that the new FQPA safeguards still did not adequately protect children.<sup>48</sup> This lack of protection is an issue because high levels of exposure to pesticides generally have been linked to childhood problems such as violence, learning disorders, Parkinson's disease, juvenile delinquency, aggression, attention problems,<sup>49</sup> poor cognitive functioning, antisocial activity,<sup>50</sup> leukemia, and other cancers.<sup>51</sup> Recently, just average levels of exposure to organophosphates have been linked to incidences of ADHD in children in the general population.<sup>52</sup>

### C. *Past Legal Theories Dealing With Exposure: Reactionary*

Courts have handled pesticide exposure through reactionary<sup>53</sup> measures such as toxic torts<sup>54</sup> and medical monitoring.<sup>55</sup> Several of these monitoring programs have primarily been applied to adult employees who work with pesticides in high-exposure areas.<sup>56</sup>

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of 2007, H.R. 3290, 110th Cong. (2007-2008); School Environmental Protection Act of 2009, H.R. 4159, 111th Cong. (2009-2010).

47. *Supra* note 46; Klein, *supra* note 1, ¶ 6.

48. Diaz, *supra* note 17, at 28.

49. *Id.* at 20.

50. Carl F. Cranor, *Do You Want to Bet Your Children's Health on Post-Market Harm Principles? An Argument for Trespass or Permission Model for Regulating Toxicants*, 19 VILL. ENVTL. L.J. 251, 268-69 (2008).

51. Watnick, *supra* note 35, at 78.

52. Maryse F. Bouchard, David C. Bellinger, Robert O. Wright & Marc G. Weisskopf, *Attention-Deficit /Hyperactivity Disorder and Urinary Metabolites of Organophosphate Pesticides*, 125 PEDIATRICS e1270 (2010), available at <http://pediatrics.aappublications.org/cgi/reprint/125/6/e1270?maxtoshow=&hits=10&RESULTFORMAT=&fulltext=bouchard&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT> (last visited Feb. 1, 2011) [hereinafter Pediatrics].

53. *See generally* Cranor, *supra* note 50 (explaining the current theories are harm-based or risk-of-harm based and are not adequately protective).

54. *See generally* Weber, *supra* note 35.

55. Adriane J. Busby & Gabriel Eckstein, *Organophosphates, Friend and Foe: The Promise of Medical Monitoring for Farm Workers and Their Families*, 27 UCLA ENVTL. L. & POL'Y 39 (2009).

56. Weber, *supra* note 35, at 246. *See also* Washington State Dep't of Labor & Indus., *Information for Farm Workers, Cholinesterase Monitoring for Pesticide Handlers* (Jan. 2006), available at <http://www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/files/CHeFactSheet-English.pdf> (focusing on mixers, loaders, applicators of pesticides) [hereinafter Washington Program]; Env'tl. Health & Pub. Safety Ctr., *Cholinesterase Biomonitoring Program*, available at <http://www.ncsu.edu/ehs/www99/right/handsMan/worker/cholinestrasc.html> (focusing on employees who are exposed to organophosphates) [hereinafter NC programs].

A toxic tort is a personal injury caused by exposure to a particular toxic substance.<sup>57</sup> Proving causation requires a finding of both general and specific causation.<sup>58</sup> General causation is whether the product has the capacity to cause an injury, while specific causation is whether the product in fact caused the injury.<sup>59</sup> Causation is hard to prove in studies that analyze incidents of diseases.<sup>60</sup> Initially, plaintiffs must prove that they were exposed to the specific substance in question.<sup>61</sup> This raises the issue of multiple causation,<sup>62</sup> proving that the injury resulted from one particular substance is difficult when a person was exposed to many substances that may cause the same injury.<sup>63</sup> For example, if both smoking and asbestos are linked to emphysema, and a person who has emphysema both smokes and works in an asbestos-ridden building, proving the emphysema resulted solely from the asbestos will be difficult and complicated.<sup>64</sup>

California follows the toxic tort model. As previously mentioned, organophosphate exposure inhibits cholinesterase levels and cholinesterase is necessary for proper nervous system functioning.<sup>65</sup> California has enacted baseline cholinesterase testing to determine if organophosphate exposure is harming mixers, loaders, or applicators of pesticides.<sup>66</sup> Measuring cholinesterase levels before and throughout farm-work can indicate pesticide exposure when the levels decrease in relation to the initial measurement.<sup>67</sup> It can be presumed that these measurements show causation because it demonstrates changes in cholinesterase levels with the variable being pesticide exposure.<sup>68</sup>

Like California's toxic torts model, medical monitoring also relies on cholinesterase levels to indicate exposure.<sup>69</sup> Washington State has such a program.<sup>70</sup> The program is mandatory for in-state workers who

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57. Weber, *supra* note 35, at 233.

58. *Id.*

59. *Id.* at 234.

60. CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, EVIDENCE UNDER THE RULES 654 (6th ed. 2008) (explaining that epidemiological studies are statistical analyses of disease incidence and is in some respects the most persuasive kind of evidence).

61. Weber, *supra* note 35, at 235.

62. MUELLER & KIRKPATRICK, *supra* note 60, at 654.

63. *Id.* (providing an example "did asbestos cause the lung cancer, or was smoking the cause, or both?")

64. *See id.*

65. *See supra* Part II.C.

66. Weber, *supra* note 35, at 246, 239 (noting also that Ohio, Arizona, Colorado, and Washington have cholinesterase testing requirements).

67. *See generally* Weber, *supra* note 35.

68. *See generally* Washington Program, *supra* note 56.

69. Busby & Eckstein, *supra* note 55, at 57.

70. *See* Washington Program, *supra* note 56.



handle organophosphates for 30 or more hours in a 30 day period.<sup>71</sup> If a worker's cholinesterase level drops 20 percent below the baseline measurement, a review of handling practices must occur.<sup>72</sup> If levels drop 30 percent below the baseline measurement, the worker will be removed from handling pesticides.<sup>73</sup> North Carolina State University also has a similar program for employees whose occupations expose them to toxic substances.<sup>74</sup> A drop of 30 percent below the baseline cholinesterase level will result in the worker's removal from the workplace.<sup>75</sup> While medical monitoring can provide evidence of causation, it still does not prevent exposure in the first instance.<sup>76</sup>

### III. NEW STUDIES: PESTICIDE EXPOSURE AND ADHD IN THE GENERAL POPULATION

As stated above, the National Academy of Science's publication influenced child-protective measures by the EPA and President Clinton.<sup>77</sup> The publication also addressed cholinesterase levels.<sup>78</sup> The report acknowledged that there is limited information about the toxicity of cholinesterase inhibitors in infants and children.<sup>79</sup> It reported, however, that the information that does exist indicates that infants and children are more susceptible than adults to problems resulting from cholinesterase inhibition.<sup>80</sup> Certain enzymes which are believed to be reflective of cholinesterase levels in the brain demonstrate that the most "pronounced effects of cholinesterase inhibit[ion] may be expected to occur in newborns, neonates, and infants" rather than adults.<sup>81</sup> Two recent studies also lend support for childhood susceptibility to cholinesterase inhibition and organophosphate exposure.<sup>82</sup> One study, published in *Pediatrics*, examined organophosphate exposure in children representative of the general population rather than children in high-exposure areas.<sup>83</sup> The other study, published in *Environmental Health Perspectives*, highlighted

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71. *Id.*

72. *Id.*

73. *Id.*

74. See NC programs, *supra* note 56.

75. *Id.*

76. See generally Cranor, *supra* note 50.

77. See *supra* Part II.B.

78. See generally Nat'l Acad. of Sciences, *Pesticides in the Diets of Infants and Children* (1993), available at [http://www.nap.edu/openbook.php?record\\_id=2126&page=R1](http://www.nap.edu/openbook.php?record_id=2126&page=R1).

79. *Id.* at 53.

80. *Id.*

81. *Id.* at 54.

82. *Pediatrics*, *supra* note 52, at e1270.

83. *Id.*

the risk of exposure to children in-utero.<sup>84</sup> Since these publications lend additional support to the National Academy of Science's report by suggesting that children are more susceptible to problems resulting from both cholinesterase inhibition and pesticide exposure, and since organophosphates inhibit cholinesterase, these findings illustrate the need for renewed efforts for protecting children. Enacting baseline cholinesterase testing for children may be one way to address this need. Before explaining how baseline testing may be implemented, the *Pediatrics* and *Environmental Health Perspectives* studies require further elaboration.

*A. Pediatrics: Children in General Population at Risk of Exposure*

The study in *Pediatrics* found a link between ADHD and organophosphate exposure.<sup>85</sup> This is important because it is the first study to "examine exposure in the population at large."<sup>86</sup> This link was found by comparing levels of specific urinary metabolites of organophosphates with incidence of ADHD in a sample of children representative of the general population.<sup>87</sup> The results of the study demonstrated that children with higher urinary concentrations of certain organophosphate metabolites<sup>88</sup> were more likely to be diagnosed with ADHD, and that children with levels higher than the "median of detectable concentrations" were twice as likely to be diagnosed.<sup>89</sup> The study acknowledged that the main source of exposure among children is believed to be through food, specifically commercially grown produce,<sup>90</sup> because the EPA banned most residential uses of pesticides.<sup>91</sup> Because organophosphates are usually eliminated from the body within three to

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84. Brenda Eskenazi et al., *Organophosphate Pesticide Exposure and Attention in Young Mexican-American Children*, 118 ENVTL HEALTH PERSPECTIVES 1768 available at <http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.1002056>. Aug. 19, 2010 (last visited Feb. 1, 2011) [hereinafter *Health Perspectives*]. See also Cranor, *supra* note 50, at 259 (toxicants can concentrate in placental cord blood, increasing toxic concentrations in a developing fetus to higher levels than in the mother's body tissues).

85. See generally *Pediatrics*, *supra* note 52.

86. Klein, *supra* note 1, ¶ 3.

87. *Pediatrics*, *supra* note 52, at e1271.

88. *Id.* at e1271-e1272 (explaining that dimethyl alkylphosphate is a metabolite of dialkyl phosphate which is a marker of organophosphates).

89. *Id.* at e1270 (slightly modifying ADHD definition from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)).

90. *Id.* at e1271.

91. Klein, *supra* note 1, ¶ 6.

six days,<sup>92</sup> their presence in a onetime<sup>93</sup> urinary sample is indicative of continuing exposure.<sup>94</sup> This continuing presence is in spite of the fact that the EPA has reduced the amount of organophosphates specifically allowable on “kid foods” and assesses the aggregate and cumulative risks.<sup>95</sup> The study also noted that disruptions in cholinergic signaling are thought to occur in children with ADHD,<sup>96</sup> and organophosphates work by inhibiting acetylcholinesterase,<sup>97</sup> which is related to cholinesterase.<sup>98</sup> Organophosphate exposure may therefore be a cause of cholinergic disruption and ADHD.

*B. Environmental Health Perspectives: Prenatal Children at Risk of Exposure*

Another study published in *Environmental Health Perspectives* reported similar findings between organophosphate exposure and ADHD.<sup>99</sup> This study examined urinary metabolites of organophosphates in pregnant women from California’s Salinas Valley, and later measured the occurrence of ADHD in postnatal children.<sup>100</sup> The results indicated that specific in-utero metabolites<sup>101</sup> were significantly linked to attention problems by age five, with the effects stronger among boys.<sup>102</sup> The experimenters were interested in prenatal exposure because “that is the period when a baby’s nervous system is developing the most.”<sup>103</sup> Given

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92. Pediatrics, *supra* note 52, at e1275 (citing DE Bradway, et al., *Comparison of Cholinesterase Activity, Residue Levels, and Urinary Metabolite Excretion of Rats Exposed to Organophosphorous Pesticides*, 25 J. AGRIC. FOOD CHEM. 1335 (1977)).

93. *Id.* (comparing to serial measurements instead of just one sample). While serial measurements would provide better assessments on average exposure, the presence of organophosphates in a onetime sample is important given how quickly they are removed from the body.

94. *Id.* at e1275.

95. EPA website FQPA, *supra* note 25.

96. Pediatrics, *supra* note 52, at e1275 (citing Coccini T. Crevani, et al., *Reduced Platelet Monoamine Oxidase Type B Activity and Lymphocyte Muscarinic Receptor Binding in Unmedicated Children with Attention Deficit Hyperactivity Disorder*, 14 BIOMARKERS 513 (2009)).

97. *Id.*

98. Compare *Acetylcholinesterase Definition*, Dictionary.com, <http://dictionary.reference.com/browse/acetylcholinesterase> (last visited, Feb. 3, 2011) with *Cholinesterase Definition*, Dictionary.com, <http://dictionary.reference.com/browse/cholinesterase> (last visited Feb. 3, 2011) (scroll down to medical dictionary).

99. See generally Eskenazi, *supra* note 84.

100. *Id.* at 1769.

101. *Id.* at 1770 (explaining that dialkyl phosphate metabolites represent the breakdown products of 80% of organophosphates used in the Salinas Valley).

102. Science Daily, *Prenatal Exposure to Pesticides Linked to Attention Problems in Children* (Aug. 19, 2010), available at <http://www.sciencedaily.com/releases/2010/08/100819074351.html>.

103. *Id.* at ¶ 3.

that organophosphates are “designed to attack the nervous system,” there is reason to be extra cautious of exposure during critical periods of in-utero and childhood neurological development.<sup>104</sup> These findings underscore the EPA’s recognition of childhood susceptibility based on children’s developing body systems.<sup>105</sup>

### C. *Reducing and Preventing Exposure to Organophosphates*

There are some quick fixes to reduce organophosphate exposure.<sup>106</sup> An article from CNN quoted an EPA spokesman, Dale Kemery, who suggested washing and peeling fruits and vegetables before consumption.<sup>107</sup> Kemery also noted that the EPA was incorporating data similar to the *Pediatrics* study in its risk-assessment.<sup>108</sup> Maryse Bouchard, a researcher from the *Pediatrics* study, suggested buying local or organic food when possible because fewer pesticides are used than on commercially-grown produce.<sup>109</sup> Organic and local food, however, is costly and may be burdensome for some families.<sup>110</sup> Brenda Eskenazi, an author of the *Environmental Health Perspectives* study, expressed concern that those who could not afford to eat local or organic would stop eating fruits and vegetables completely.<sup>111</sup> She thus suggested that people who cannot afford it should give their fruits and vegetables “a good scrub.”<sup>112</sup> Other ways to reduce exposure is to buy IPM labeled food, or follow IPM practices, which will be explained below.<sup>113</sup>

### D. *Other Ways to Control Exposure: Mandatory Testing for Children*

#### 1. School Vaccination Laws as a Model

Since the *Pediatrics* study indicated that children in the general population are at risk of organophosphate exposure which inhibits cholinesterase,<sup>114</sup> mandatory cholinesterase testing may be one way to track exposure and take early preventative measures if exposure is

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104. *Id.* at ¶ 8.

105. *See supra* Part II.B.

106. Klein, *supra* note 1, ¶ 9; Emily Sohn, *ADHD Linked to Pesticide Exposure*, Aug. 20, 2010, <http://news.discovery.com/human/adhd-pesticides-children-behavior.html> ¶ 12 (last visited Feb. 1, 2011).

107. Klein, *supra* note 1, ¶ 21.

108. *Id.*

109. *Id.* ¶ 8; Sohn, *supra* note 106, ¶ 12.

110. Sohn, *supra* note 106, ¶ 14.

111. *Id.*

112. *Id.* ¶ 12.

113. *See infra* Part IV.

114. *See supra* Part III.A.

indicated. Cholinesterase levels can be detected by blood tests.<sup>115</sup> One way to implement mandatory testing would be to follow school vaccination laws as a model for public school children. Though no federal law mandates school vaccinations, every state has a compulsory vaccination law for children in public schools.<sup>116</sup> The Supreme Court has upheld such laws as valid exercises under both the state's police power and the *parens patriae* doctrine.<sup>117</sup> Under its police power, a state can enforce laws that reasonably protect the public health, safety, and welfare.<sup>118</sup> Under the *parens patriae* doctrine, the state can assert its own control "over child welfare" when parental control is lacking.<sup>119</sup>

## 2. Comparisons: Purposes of Cholinesterase and Vaccination Statutes

Vaccination laws protect both the individual child and the community from spreadable diseases.<sup>120</sup> Cholinesterase testing laws would likely have the same general purposes of protecting individuals and the community, except such protection would relate to exposure and exposure-related problems rather than "spreadable" diseases.<sup>121</sup>

Early detection of cholinesterase inhibition and organophosphate exposure is important because it can lead to timely treatment. Immediate treatment is recommended for suspected organophosphate poisoning.<sup>122</sup> Such treatment consists of "decontamination measures, cardiorespiratory support, and seizure control" if necessary.<sup>123</sup> Imposing cholinesterase testing would have a separate effect of increasing parental awareness to the dangers of organophosphates. More awareness itself can lead to changes in dietary behaviors for those parents who can afford them.<sup>124</sup>

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115. Washington Program, *supra* note 56.

116. Ctrs. for Disease Control and Prevention, *State Vaccination Requirements*, available at <http://www.cdc.gov/vaccines/vac-gen/laws/state-reqs.htm>.

117. Kevin M. Malone & Alan R. Hinman, *Vaccination Mandates: The Public Health Imperative and Individual Rights*, 262, 271-73, available at [http://www.cdc.gov/vaccines/vac-gen/policies/downloads/vacc\\_mandates\\_chptr13.pdf](http://www.cdc.gov/vaccines/vac-gen/policies/downloads/vacc_mandates_chptr13.pdf).

118. SAMUEL M. DAVIS, ELIZABETH S. SCOTT, WALTER WADLINGTON & CHARLES H. WHITEBREAD, *CHILDREN IN THE LEGAL SYSTEM* 17 (Foundation Press, 4th ed. 2009).

119. *Id.*; Malone & Hinman, *supra* note 117, at 271-73.

120. Malone & Hinman, *supra* note 117 at 264. *See also* ALA. CODE § 11-47-132 (2008) ("to prevent the introduction or spread"); ALASKA STAT. § 14.30.125 (2011) ("necessary for the welfare of the children").

121. *See supra* Part III.D.1.

122. PEDIATRIC ENVTL. HEALTH SPECIALTY UNIT, ORGANOPHOSPHATE PESTICIDES & CHILD HEALTH: A PRIMER FOR HEALTH CARE PROVIDERS, ACUTE POISONING (2007), [http://depts.washington.edu/opchild/pdf/3\\_Acute\\_Poisoning.pdf](http://depts.washington.edu/opchild/pdf/3_Acute_Poisoning.pdf).

123. *Id.*

124. *See supra* Part III.C.

### 3. Statutory Exemptions to Mandatory Vaccinations

Currently, 48 states statutorily permit religious exemptions to mandatory vaccination laws.<sup>125</sup> A case out of New York held that “sincerely held religious beliefs” against vaccinations would be sufficient to qualify for the exemption, whether or not such beliefs are part of a recognized religion.<sup>126</sup> Considering that 48 states allow for religiously based exemptions to vaccinations despite the state police powers and *parens patriae* doctrine, statutes providing for cholinesterase testing may include such exemptions as well.

### 4. Consequences: Preventing Attendance in Schools

In *Zucht v. King*, the Court held that prohibiting a child from attending school for lack of vaccination did not violate the Equal Protection Clause of the 14<sup>th</sup> Amendment.<sup>127</sup> Prohibiting attendance was determined to be a valid police power of the state for the protection of public health.<sup>128</sup> Cholinesterase testing would not likely have to follow this precedent. Cholinesterase testing is not for the specific purpose of preventing the spread of communicable diseases, but instead to protect against exposure.<sup>129</sup> Because cholinesterase inhibition does not deal with the spread of a disease, it is unlikely that a child who shows signs of inhibition will be prohibited from attending school. In this way, cholinesterase testing appears to be less intrusive on a child’s life because it would not directly keep the child out of school or away from peers.

### E. Other Potential Solutions

Rather than reactive measures focusing on restoring cholinesterase levels after exposure, other solutions may be used to prevent or reduce the use of organophosphates from the beginning. A trend has been towards Integrated Pest Management systems (“IPMs”) which focus on preventing pest problems without total reliance on chemical pesticides.<sup>130</sup>

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125. Malone & Hinman, *supra* note 117, at 273. See, e.g., DEL. CODE ANN. tit. 14, § 131 (2007).

126. Malone & Hinman, *supra* note 117, at 271-73 (describing *Sherr v. Northport-East Northport Union Free School District*, 672 F.Supp. 81 (E.D.N.Y. 1987)).

127. *Zucht v. King*, 260 U.S. 174, 177 (1922).

128. *Id.* (distinguishing broad discretionary power from arbitrary power).

129. See *supra* Part II.C.

130. EPA website food, *supra* note 3.

#### IV INTEGRATED PEST MANAGEMENT (IPM) SYSTEMS: SHIFT FROM REACTIVE TO PROACTIVE

The FQPA, discussed above,<sup>131</sup> defines IPM as a “sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimize economic, health, and environmental risk.”<sup>132</sup> Regarding IPMs, the FQPA mandates the EPA to implement research, demonstration, and educational programs.<sup>133</sup> In executing the research and demonstration programs, the EPA funded programs to initiate and maintain IPM methods in schools and low-income housing.<sup>134</sup> In executing the educational programs, the EPA conducted training for at-risk populations and public health and housing officials with the United States Department of Agriculture.<sup>135</sup> This can be insufficient in light of the *Pediatrics* study above, which indicates that children in areas that are not typically considered high-exposure are also at risk.<sup>136</sup> Perhaps the EPA should widen its target audiences for the three types of programs. In general, the adoption of IPMs indicates a shift towards proactive rather than reactive measures.<sup>137</sup>

##### A. *Reducing the Use of Pesticides*

As of Fall 2009, 35 states adopted laws that addressed pesticide use in schools, and 21 of these recommended or required an IPM system.<sup>138</sup> Federal legislation was proposed in 2007<sup>139</sup> and 2009<sup>140</sup> to amend FIFRA<sup>141</sup> by implementing IPM programs in schools, but neither of these reforms passed.

North Carolina is a success story for an IPM program on school grounds.<sup>142</sup> After implementing an IPM program, Wake County School

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131. See *supra* Part II.B.

132. Integrated Pest Management, 7 U.S.C.S. § 136r-l.

133. *Id.*

134. EPA website FQPA, *supra* note 25.

135. *Id.*

136. Klein, *supra* note 1, ¶ 3.

137. EPA website factsheets, *supra* note 45 (explaining that IPMs are used to manage pest damage “with the least possible hazard to people, property and the environment”).

138. Kagen Owens, *Schooling of State Pesticide Laws*, 29 PESTICIDES AND YOU 9, 11 (2009 & 2010 update), available at <http://www.beyondpesticides.org/schools/publications/Schooling2010.pdf> (last visited Feb. 1, 2011).

139. School Environment Protection Act of 2007, H.R. 3290, 110th Cong. (2007-2008).

140. School Environment Protection Act of 2009, H.R. 4159, 111th Cong. (2009-2010).

141. See *supra* Part II.A.

142. See generally Fawn Pattison & Katherine M. Shea, A Collaborative Model for Children’s Environmental Health Policy: The North Carolina School Children’s Health

District reduced its annual use of liquid pesticides from 38,000 gallons to five.<sup>143</sup> It also completely eliminated the use of foggers<sup>144</sup> and dusts.<sup>145</sup> The success of this program was attributed to “monitoring pest levels, implementing multiple pest management strategies, communication among all users of the facilities, education about pest prevention methods, notification of pesticide applications to all users of the facilities, keeping records of pest outbreaks, and a written policy.”<sup>146</sup>

North Carolina’s IPM school programs also acknowledged that food service areas need the most attention.<sup>147</sup> North Carolina State University issued a newsletter which recommended keeping pests out of food areas by keeping everything clean, dry and tight—meaning the pests will have nowhere to hide, nothing to eat, and no way to enter.<sup>148</sup>

### *B. Focus on the Food*

This focus on prohibiting pesticide applications on school grounds is important, but it does not address the fact that the largest source of exposure is considered to be through food, not school yards or school buildings.<sup>149</sup> New York has pending legislation that would restrict pesticide use and implement an IPM plan for food-selling establishments.<sup>150</sup> New York defines IPM as a “systematic approach to managing pests that utilizes a diversity of management options to minimize health, environmental, and economic risks. These options may include biological, cultural, physical, and chemical tools to prevent pest infestations or reduce them to acceptable levels.”<sup>151</sup> There are four main requirements of the proposed bill: 1) broadcast sprays are prohibited in and immediately adjacent to all food selling establishments; 2) pesticide application in fresh produce sections are prohibited; 3) only certified applicators are authorized to apply pesticides within and immediately adjacent to food selling establishments; and 4) notice at customer

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Act of 2006, 17 DUKE ENVTL. L. & POL’Y F 233 (2007); 2006 N.C. Sess. Laws 2006-143.

143. Pattison & Shea, *supra* note 142, at 238.

144. *Foggers Definition*, Dictionary.com, <http://dictionary.reference.com/browse/foggers> (last visited Feb. 3, 2011).

145. *Dusting Definition*, Dictionary.com, <http://dictionary.reference.com/browse/dusting> (last visited Feb. 3, 2011); Pattison & Shea, *supra* note 142, at 238.

146. Pattison & Shea, *supra* note 142, at 238.

147. Integrated Pest Management: School IPM Campaign, Get Tough on Pests in Food Service Areas, *available at* <http://schoolipm.ncsu.edu/documents/IPMforFoodserviceemployees.pdf>.

148. *Id.*

149. JoNel Aleccia, *Pesticides in Kids Linked to ADHD*, (May 18, 2010) ¶ 6, *available at* [http://www.msnbc.msn.com/id/37156010/ns/health-kids\\_and\\_parenting/](http://www.msnbc.msn.com/id/37156010/ns/health-kids_and_parenting/).

150. Assem. 2663, 235th Sess. (N.Y. 2009).

151. Assem. 4147a, 235th Sess. (N.Y. 2009).



entrances is mandatory.<sup>152</sup> The notice must indicate that pesticides were used indoors with the date of application, the name of the pesticide business and certified applicator, the name of the pesticide product, the registration number, and the active ingredient.<sup>153</sup> While this bill does not have the stated purpose of reducing exposure to children,<sup>154</sup> limiting the use of pesticides in food-selling establishments would be beneficial. The New York bill would prevent the additional application of pesticides on fresh produce in food-selling establishments, and thus help those families who are burdened by organic prices to continue to eat commercial fruits and vegetables while limiting exposure.<sup>155</sup>

The New York bill would also bolster the safety tolerance level of the FQPA.<sup>156</sup> The FQPA requires a reasonable certainty of no harm from residues based on aggregate exposure.<sup>157</sup> Nothing in the FQPA section on tolerances mentions pesticide applications at food-selling establishments.<sup>158</sup> Though the New York bill does not mention the FQPA, it would appear to keep the tolerance levels within the standard created by the FQPA by preventing additional pesticide applications.

### C. *Potential Problems with New York's Legislation*

Despite these benefits, potential statutory problems exist. The proposed bill is intended to add title 14 to article 33 of the Environmental Conservation Law.<sup>159</sup> Article 33 is the section covering pesticides.<sup>160</sup> The proposed bill would add a definition of IPM, but it does not offer a definition of food-selling establishment.<sup>161</sup> This is especially problematic because the term is not defined elsewhere in the Environmental Conservation Law.<sup>162</sup> Without this definition, problems

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152. Assem. 2663, *supra* note 150.

153. *Id.*

154. New York currently has proposed legislation for IPM programs at day care centers and child care facilities to provide extra protection for children because their "smaller body size, developing organ systems, hand-to-mouth behaviors exposes children to more toxic substances per pound of body weight than adults." S. 4904, 235th Sess. (N.Y. 2009).

155. Sohn, *supra* note 106, ¶ 14.

156. Safety is determined as a reasonable certainty of no harm. Pub. L. 104-170, § 408(2)(a)(ii) *amending* 21 U.S.C.A. § 346a.

157. *See* Pub. L. 104-170, § 405 *amending* 21 U.S.C. § 346a(b)(2)(A)(ii).

158. Pub. L. 104-170, § 408.

159. *Id.*

160. N.Y. ENVTL. CONSERV. LAW § 33 (McKinney 2008).

161. Assem. 2663, *supra* note 150 (*see summary, available at* [http://assembly.state.ny.us/leg/?default\\_fld=&bn=A02663%09%09&Summary=Y&Memo=Y](http://assembly.state.ny.us/leg/?default_fld=&bn=A02663%09%09&Summary=Y&Memo=Y)).

162. N.Y. ENVTL. CONSERV. LAW § 33-0103 (McKinney 2008); N.Y. ENVTL. CONSERV. LAW § 1-0303 (McKinney 2008); N.Y. ENVTL. CONSERV. LAW § 11-0103 (McKinney 2008); N.Y. ENVTL. CONSERV. LAW § 15-0107 (McKinney 2008); N.Y.

may arise as to what type of food establishments the bill would actually apply.

Case law in New York, however, has resolved statutory problems by following traditional principles of statutory construction such as plain meaning<sup>163</sup> and legislative intent.<sup>164</sup> The courts also defer to the Department of Environmental Conservation (“DEC”) when statutory interpretations require factual expertise.<sup>165</sup> In addition to this broad deference, the Commissioner of the DEC has jurisdiction “in all matters pertaining to the distribution, sale, use, and transportation of pesticides.”<sup>166</sup> This provision is understood to pre-empt local laws in order to achieve uniformity in pesticide regulations.<sup>167</sup>

Since the courts look to plain meaning in interpreting a statute, including a definition for food-selling establishments could avoid this potential problem based on what establishments are covered. *Sosa v. Golub, Corp.* may also be instructive.<sup>168</sup> In that case, the New York Supreme Court used the term “fresh produce section” when describing a supermarket.<sup>169</sup> The proposed bill uses the same language as it prohibits the application of pesticides in the “fresh produce section of the establishment.”<sup>170</sup> It is possible that New York courts would interpret the bill similarly to *Sosa* and apply the bill only to supermarkets.

The second issue is more complex. According to § 33-0101 of the Environmental Conservation Law, a “restricted use pesticide” is a pesticide:

- a. Which (1) either (a) persists in the environment or (b) accumulates as either the pesticide per se, a pesticide metabolite, or is not excreted or eliminated within a reasonable period of time; and (2) which by virtue of such persistence or accumulation creates a present or future risk of harmful effects on any organism other than the target organism; or

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ENVTL. CONSERV. LAW § 19-0107 (McKinney 2008); N.Y. ENVTL. CONSERV. LAW § 23-0101 (McKinney 2008); N.Y. ENVTL. CONSERV. LAW § 72-0103 (McKinney 2008).

163. *State v. Sour Mountain Realty, Inc.*, 703 N.Y.S.2d 854, 859 (1999); *City of N.Y. v. N.Y. State Dep’t of Conservation* 125 Misc.2d 735, 740 (1984).

164. *Eric County v. Flacke*, 80 A.D.2d 954, 955 (N.Y. App. Div. 1981).

165. *Seymour v. N.Y. State Dep’t. of Env’tl. Conservation*, 184 A.D.2d 101, 105 (N.Y. App. Div. 1992).

166. N.Y. ENVTL. CONSERV. LAW § 33-0303 (McKinney 2008).

167. *Ames v. Smoot*, 98 A.D.2d 216, 219 (N.Y. App. Div. 1983).

168. *Sosa v. Golub Corp.*, 273 A.D.2d 762 (N.Y. App. Div. 2000).

169. *See generally id.*

170. *Assem. 2663, supra* note 150.

b. Which the commissioner finds so hazardous to man or other forms of life that restrictions on its sale, purchase, use, or possession are in the public interest.<sup>171</sup>

As explained above, organophosphates are usually eliminated from the body within three to six days.<sup>172</sup> This short time frame may weigh against the labeling of organophosphates under section "a" of the "restricted use" provision.

The Commissioner, however, may still find that organophosphate pesticides are sufficiently hazardous to impose restrictions in the public interest under section "b." After a hearing, the Commissioner of the DEC creates a list of restricted use pesticides and decides what usages are permissible, subject to whatever limitations and conditions he or she deems appropriate to protect the public interest.<sup>173</sup> The Environmental Conservation Law also authorizes the Commissioner to "adopt, promulgate, and issue rules and regulations as he [or she] may deem necessary to carry out and give full force and effect to the provisions" of Article 33.<sup>174</sup> Based on express language and legislative history, the court in *Chemical Specialties Manufactures Ass'n v. Jorling* determined that the Commissioner can act against dangerous pesticides, and even create a complete ban in certain circumstances, by rulemaking rather than adjudication.<sup>175</sup> Such a rule can eliminate a party's right to a hearing by redefining the nature of a substantive right.<sup>176</sup> The court stated, "[e]ven where an agency's enabling statute expressly requires a hearing[,], the agency may rely on rule-making authority to determine issues that do not require case-by-case consideration."<sup>177</sup> Promulgating a list of restricted use pesticides is "necessarily a fact-finding power" which is "no different from rule-making" power.<sup>178</sup> This means the Commissioner can determine certain pesticides to be restricted use through rule-making and thus ban their use without an adjudicatory hearing. To comply with proper rule-making requirements, the Commissioner must notify registrants of the proposed rule and publish the notice with the time of the hearing and the rationale for the rule.<sup>179</sup>

If the Commissioner bans organophosphates, or certain types of organophosphates, as "restricted use," that will add extra protection to

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171. N.Y. ENVTL. CONSERV. LAW § 33-0101(42) (McKinney 2008).

172. Pediatrics, *supra* note 52, at e1271.

173. N.Y. ENVTL. CONSERV. LAW § 33-0303(3)(d) (McKinney 2008).

174. Chemical Specialties Mfrs. Ass'n. v. Jorling, 85 N.Y.2d 382, 389 (N.Y. 1995).

175. *Id.* at 388-90.

176. *Id.* at 391 (citing 1 DAVIS AND PIERCE, ADMINISTRATIVE LAW § 6.5, at 250 (3d ed.)).

177. *Id.* (quoting Heckler v. Campbell, 461 U.S. 458, 467 (1983)).

178. *Id.* at 392.

179. Chemical Specialties Mfrs. Ass'n. v. Jorling, 85 N.Y.2d. 382, 87 (N.Y. 1995).

the proposed legislation on food-selling establishments. Not only will an IPM plan be in place,<sup>180</sup> but if chemical pesticides end up being used as a last resort, they will not contain organophosphates. Banning organophosphates would also lessen the need for cholinesterase testing. Since organophosphates affect the nervous system by inhibiting cholinesterase,<sup>181</sup> preventing exposure to organophosphates would protect normal cholinesterase levels. Currently, medical monitoring and toxic torts tend to focus on treating exposure or preventing too much exposure in high risk areas.<sup>182</sup> The *Pediatrics* study highlighted the fact that children in the general population are at risk.<sup>183</sup> These factors indicate the need for preventive measures in the first place. Given that the Commissioner in New York State has such broad discretion to ban pesticide use through rulemaking power,<sup>184</sup> the Commissioner has the chance to protect children from organophosphate exposure.

*D. How to Buy IPM Products: IPM Labels*

How can consumers be sure that what they are eating follows IPM principles? Aside from the proposed New York bill, there is an emerging trend for using IPM food labels in New York and elsewhere.<sup>185</sup> Wegmans, a New York supermarket, is selling certain canned vegetables with IPM labels.<sup>186</sup> This labeling effort was initiated by the retail food industry.<sup>187</sup> Cornell University works with the New York State IPM Program to provide agricultural producers with the necessary information to meet IPM label requirements.<sup>188</sup> For consumers who do not have the option to buy labeled IPM products, the New York legislation for IPM control of food-selling establishments is helpful.

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180. Assem. 2663, *supra* note 150.

181. *See supra* Part II.B.

182. *See generally* Weber, *supra* note 35. *See also* Cranor, *supra* note 50.

183. Klein, *supra* note 1, ¶ 3.

184. Chemical Specialties Mfrs. Ass'n. v. Jorling, 85 N.Y.2d 382, 388-90 (N.Y. 1995).

185. Cornell University, New York State Integrated Pest Management Program, *IPM Labeling: The Latest Developments*, available at <http://nysipm.cornell.edu/labeling/labnews.asp> ¶ 6.

186. Cornell University, New York State Integrated Pest Management Program, *An IPM Label on Supermarket Vegetables: A First for the Nation*, available at <http://nysipm.cornell.edu/labeling/labels.asp>.

187. Cornell University, New York State Integrated Pest Management Program, *Cornell's Role in IPM Labeling*, available at <http://nysipm.cornell.edu/labeling/role.asp>.

188. *Id.*

## V. CONCLUSION

Despite growing awareness and increasing protection concerning pesticide exposure, potential problems arising from exposure still exist. Exposure to cholinesterase-inhibiting organophosphates has been linked to childhood ADHD in the general population. Following a school vaccination model, states can track exposure for public school children by testing cholinesterase levels. Hopefully this testing will call attention to exposure before it becomes too problematic. Buying local, organic, or IPM-labeled food can also combat exposure to some extent by decreasing the amount of pesticides being consumed. Since the main source of exposure is believed to be dietary, the focus on reducing pesticides on school grounds should shift towards preventing applications on commercially grown produce and other food establishments. The New York legislation imposing IPM programs on food-selling establishments is a great focus point. A definition of food-selling establishments would be helpful for statutory interpretation. The Commissioner of the Department of Environmental Conservation is given great deference to decisions dealing with pesticides. Banning organophosphates and implementing IPMs would help protect children in the general population against exposure and serious problems like ADHD.