

Cited References on the Developmental Toxicity of Chlorpyrifos Provided to the Developmental and Reproductive Toxicant Identification Committee (DARTIC)¹

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Abou-Donia MB, Khan WA, Dechkovskaia AM, Goldstein LB, Bullman SL and Abdel-Rahman A (2006). In utero exposure to nicotine and chlorpyrifos alone, and in combination produces persistent sensorimotor deficits and Purkinje neuron loss in the cerebellum of adult offspring rats. *Arch Toxicol* **80**(9): 620-631.

Akhtar N, Srivastava MK and Raizada RB (2006). Transplacental disposition and teratogenic effects of chlorpyrifos in rats. *J Toxicol Sci* **31**(5): 521-527.

Aldridge JE, Levin ED, Seidler FJ and Slotkin TA (2005). Developmental exposure of rats to chlorpyrifos leads to behavioral alterations in adulthood, involving serotonergic mechanisms and resembling animal models of depression. *Environ Health Perspect* **113**(5): 527-531.

Aldridge JE, Meyer A, Seidler FJ and Slotkin TA (2005). Alterations in central nervous system serotonergic and dopaminergic synaptic activity in adulthood after prenatal or neonatal chlorpyrifos exposure. *Environ Health Perspect* **113**(8): 1027-1031.

Aldridge JE, Seidler FJ, Meyer A, Thillai I and Slotkin TA (2003). Serotonergic Systems Targeted by Developmental Exposure to Chlorpyrifos: Effects during Different Critical Periods. *Environ Health Perspect* **111**(14): 1736-1743.

Aldridge JE, Seidler FJ and Slotkin TA (2004). Developmental exposure to chlorpyrifos elicits sex-selective alterations of serotonergic synaptic function in adulthood: critical periods and regional selectivity for effects on the serotonin transporter, receptor subtypes, and cell signaling. *Environ Health Perspect* **112**(2): 148-155.

¹ The references provided are cited in sections on developmental toxicity excerpted from: Office of Environmental Health Hazard Assessment (2008). Evidence on the Reproductive and Developmental Toxicity of Chlorpyrifos. September 2008.
US Environmental Protection Agency (US EPA, 2014). Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review.
US EPA (2016). Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review. Available at (<https://oehha.ca.gov/proposition-65/crn/hazard-identification-materials-consideration-developmental-toxicity>)

Ali BH (2001). Dimethyl sulfoxide: recent pharmacological and toxicological research. *Vet Hum Toxicol* **43**(4): 228-231.

Allen, T. R. (1990). 52-week oral toxicity (feeding) study with azinphosmethyl (E 1582) in the dog, Mobay Chemical Corporation. Report No. 1006444 DPR 154-254, No. 089216.

Ambali SF and Ayo JO (2012). Vitamin C Attenuates Chronic Chlorpyrifos-induced Alteration of Neurobehavioral Parameters in Wistar Rats. *Toxicol Int* **19**(2): 144-152.

Andrews K and Fitzgerald M (1997). Biological barriers to paediatric pain management. *Clin J Pain* **13**(2): 138-143.

Arunajadai SG and Rauh VA (2012). Handling covariates subject to limits of detection in regression. *Environ Ecol Stat* **19**: 369-391.

Atterberry TT, Burnett WT and Chambers JE (1997). Age-related differences in parathion and chlorpyrifos toxicity in male rats: target and nontarget esterase sensitivity and cytochrome P450-mediated metabolism. *Toxicol Appl Pharmacol* **147**(2): 411-418.

Augustsson H, Dahlborn K and Meyerson BJ (2005). Exploration and risk assessment in female wild house mice (*Mus musculus musculus*) and two laboratory strains. *Physiol Behav* **84**(2): 265-277.

Avila J, Dominguez J and Diaz-Nido J (1994). Regulation of microtubule dynamics by microtubule-associated protein expression and phosphorylation during neuronal development. *Int J Dev Biol* **38**(1): 13-25.

Axelrad JC, Howard CV and McLean WG (2002). Interactions between pesticides and components of pesticide formulations in an in vitro neurotoxicity test. *Toxicology* **173**(3): 259-268.

Bagchi D, Bagchi M, Hassoun EA and Stohs SJ (1995). In vitro and in vivo generation of reactive oxygen species, DNA damage and lactate dehydrogenase leakage by selected pesticides. *Toxicology* **104**(1-3): 129-140.

Bagchi D, Bhattacharya G and Stohs SJ (1996). In vitro and in vivo induction of heat shock (stress) protein (Hsp) gene expression by selected pesticides. *Toxicology* **112**(1): 57-68.

Baireddy P, Liu J, Hinsdale M and Pope C (2011). Comparative effects of chlorpyrifos in wild type and cannabinoid Cb1 receptor knockout mice. *Toxicol Appl Pharmacol* **256**(3): 324-329.

Barone S, Jr., Das KP, Lassiter TL and White LD (2000). Vulnerable processes of nervous system development: a review of markers and methods. *Neurotoxicology* **21**(1-2): 15-36.

Barr DB, Allen R, Olsson AO, Bravo R, Caltabiano LM, Montesano A, Nguyen J, Udunka S, Walden D, Walker RD, Weerasekera G, Whitehead RD, Schober SE and Needham LL (2005). Concentrations of selective metabolites of organophosphorus pesticides in the United States population. *Environ Res* **99**(3): 314-326.

Barr DB, Barr JR, Maggio VL, Whitehead RD, Jr., Sadowski MA, Whyatt RM and Needham LL (2002). A multi-analyte method for the quantification of contemporary pesticides in human serum and plasma using high-resolution mass spectrometry. *J Chromatogr B Analyt Technol Biomed Life Sci* **778**(1-2): 99-111.

Basha M and Poojary A (2012a). Cold stress offered modulation on chlorpyrifos toxicity in aging rat central nervous system. *Toxicol Int* **19**(2): 173-181.

Basha PM and Poojary A (2012b). Oxidative macromolecular alterations in the rat central nervous system in response to experimentally co-induced chlorpyrifos and cold stress: a comparative assessment in aging rats. *Neurochem Res* **37**(2): 335-348.

Bebe FN and Panemangalore M (2003). Exposure to low doses of endosulfan and chlorpyrifos modifies endogenous antioxidants in tissues of rats. *J Environ Sci Health B* **38**(3): 349-363.

Bellinger D, Leviton A, Waternaux C, Needleman H and Rabinowitz M (1988). Low-level lead exposure, social class, and infant development. *Neurotoxicol Teratol* **10**(6): 497-503.

Bellinger D, Sloman J, Leviton A, Rabinowitz M, Needleman HL and Waternaux C (1991). Low-level lead exposure and children's cognitive function in the preschool years. *Pediatrics* **87**(2): 219-227.

Bellinger DC (2008). Late neurodevelopmental effects of early exposures to chemical contaminants: Reducing uncertainty in epidemiological studies. *Basic Clin Pharmacol Toxicol* **102**(2): 237-244.

Bellinger DC (2012). A strategy for comparing the contributions of environmental chemicals and other risk factors to neurodevelopment of children. *Environ Health Perspect* **120**(4): 501-507.

Berger-Sweeney J and Hohmann CF (1997). Behavioral consequences of abnormal cortical development: insights into developmental disabilities. *Behav Brain Res* **86**(2): 121-142.

Berkowitz GS, Obel J, Deych E, Lapinski R, Godbold J, Liu Z, Landrigan PJ and Wolff MS (2003). Exposure to indoor pesticides during pregnancy in a multiethnic, urban cohort. *Environ Health Perspect* **111**(1): 79-84.

Berkowitz GS, Wetmur JG, Birman-Deych E, Obel J, Lapinski RH, Godbold JH, Holzman IR and Wolff MS (2004). In utero pesticide exposure, maternal paraoxonase activity, and head circumference. *Environ Health Perspect* **112**(3): 388-391.

Billauer-Haimovitch H, Slotkin TA, Dotan S, Langford R, Pinkas A and Yanai J (2009). Reversal of chlorpyrifos neurobehavioral teratogenicity in mice by nicotine administration and neural stem cell transplantation. *Behav Brain Res* **205**(2): 499-504.

Blair A, Thomas K, Coble J, Sandler DP, Hines CJ, Lynch CF, Knott C, Purdue MP, Zahm SH, Alavanja MC, Dosemeci M, Kamel F, Hoppin JA, Freeman LB and Lubin JH (2011). Impact of pesticide exposure misclassification on estimates of relative risks in the Agricultural Health Study. *Occup Environ Med* **68**(7): 537-541.

Bouchard M, Gosselin NH, Brunet RC, Samuel O, Dumoulin MJ and Carrier G (2003). A toxicokinetic model of malathion and its metabolites as a tool to assess human exposure and risk through measurements of urinary biomarkers. *Toxicol Sci* **73**(1): 182-194.

Bouchard MF, Bellinger DC, Wright RO and Weisskopf MG (2010). Attention-deficit/hyperactivity disorder and urinary metabolites of organophosphate pesticides in U.S. children 8-15 years. *Pediatrics* **125**(6): e1270-1277.

Bouchard MF, Chevrier J, Harley KG, Kogut K, Vedar M, Calderon N, Trujillo C, Johnson C, Bradman A, Barr DB and Eskenazi B (2011). Prenatal exposure to organophosphate pesticides and IQ in 7-year-old children. *Environ Health Perspect* **119**(8): 1189-1195.

Bradley RH and Corwyn RF (2002). Socioeconomic status and child development. *Annu Rev Psychol* **53**: 371-399.

Bradman A, Barr DB, Claus Henn BG, Drumheller T, Curry C and Eskenazi B (2003). Measurement of pesticides and other toxicants in amniotic fluid as a potential biomarker of prenatal exposure: a validation study. *Environ Health Perspect* **111**(14): 1779-1782.

Bradman A, Eskenazi B, Barr DB, Bravo R, Castorina R, Chevrier J, Kogut K, Harnly ME and McKone TE (2005). Organophosphate urinary metabolite levels during pregnancy and after delivery in women living in an agricultural community. *Environ Health Perspect* **113**(12): 1802-1807.

Bradman A, Whitaker D, Quiros L, Castorina R, Henn BC, Nishioka M, Morgan J, Barr DB, Harnly M, Brisbin JA, Sheldon LS, McKone TE and Eskenazi B (2007). Pesticides and their metabolites in the homes and urine of farmworker children living in the Salinas Valley, CA. *J Expo Sci Environ Epidemiol* **17**(4): 331-349.

Bradway DE, Shafik TM and Lores EM (1977). Comparison of cholinesterase activity, residue levels, and urinary metabolite excretion of rats exposed to organophosphorus pesticides. *J Agric Food Chem* **25**(6): 1353-1358.

Braquenier JB, Quertemont E, Tirelli E and Plumier JC (2010). Anxiety in adult female mice following perinatal exposure to chlorpyrifos. *Neurotoxicol Teratol* **32**(2): 234-239.

Breslin WJ, Liberacki AB, Dittenber DA and Quast JF (1996). Evaluation of the developmental and reproductive toxicity of chlorpyrifos in the rat. *Fundam Appl Toxicol* **29**(1): 119-130.

Brimijoin S and Koenigsberger C (1999). Cholinesterases in neural development: new findings and toxicologic implications. *Environ Health Perspect* **107 Suppl 1**: 59-64.

Brubaker CJ, Dietrich KN, Lanphear BP and Cecil KM (2010). The influence of age of lead exposure on adult gray matter volume. *Neurotoxicology* **31**(3): 259-266.

Burchinal MR, Campbell FA, Bryant DM, Wasik BH and Ramey CT (1997). Early Intervention and Mediating Processes in Cognitive Performance of Children of Low-Income African American Families. *Child Dev* **68**(5): 935 - 954.

Buznikov GA, Shmukler YB and Lauder JM (1996). From oocyte to neuron: do neurotransmitters function in the same way throughout development? *Cell Mol Neurobiol* **16**(5): 537-559.

Campanha HM, Carvalho F and Schlosser PM (2014). Active and peripheral anionic sites of acetylcholinesterase have differential modulation effects on cell proliferation, adhesion and neuritogenesis in the NG108-15 cell line. *Toxicol Lett* **230**(2): 122-131.

Carr RL, Chambers HW, Guarisco JA, Richardson JR, Tang J and Chambers JE (2001). Effects of repeated oral postnatal exposure to chlorpyrifos on open-field behavior in juvenile rats. *Toxicol Sci* **59**(2): 260-267.

Carr RL, Adams AL, Kepler DR, Ward AB and Ross MK (2013). Induction of endocannabinoid levels in juvenile rat brain following developmental chlorpyrifos exposure. *Toxicol Sci* **135**(1): 193-201.

Carr RL, Borazjani A and Ross MK (2011). Effect of developmental chlorpyrifos exposure, on endocannabinoid metabolizing enzymes, in the brain of juvenile rats. *Toxicol Sci* **122**(1): 112-120.

Carr RL, Graves CA, Mangum LC, Nail CA and Ross MK (2014). Low level chlorpyrifos exposure increases anandamide accumulation in juvenile rat brain in the absence of brain cholinesterase inhibition. *Neurotoxicology* **43**: 82-89.

Casida JE and Quistad GB (2004). Organophosphate toxicology: safety aspects of nonacetylcholinesterase secondary targets. *Chem Res Toxicol* **17**(8): 983-998.

CDC (2009). Fourth National Report on Human Exposure to Environmental Chemicals. Chemical Information. Organophosphorus Insecticides: Dialkyl Phosphate Metabolites Services, DoHaH and Prevention, CfDCA. Atlanta. from <https://www.cdc.gov/exposurereport/pdf/FourthReport.pdf>.

Cecchi A, Rovedatti MG, Sabino G and Magnarelli GG (2012). Environmental exposure to organophosphate pesticides: assessment of endocrine disruption and hepatotoxicity in pregnant women. *Ecotoxicol Environ Saf* **80**: 280-287.

Cecil KM, Brubaker CJ, Adler CM, Dietrich KN, Altaye M, Egelhoff JC, Wessel S, Elangovan I, Hornung R, Jarvis K and Lanphear BP (2008). Decreased brain volume in adults with childhood lead exposure. *PLoS Med* **5**(5): e112.

Cecil KM, Dietrich KN, Altaye M, Egelhoff JC, Lindquist DM, Brubaker CJ and Lanphear BP (2011). Proton magnetic resonance spectroscopy in adults with childhood lead exposure. *Environ Health Perspect* **119**(3): 403-408.

Chakraborti TK, Farrar JD and Pope CN (1993). Comparative neurochemical and neurobehavioral effects of repeated chlorpyrifos exposures in young and adult rats. *Pharmacol Biochem Behav* **46**(1): 219-224.

Chambers H, Brown B and Chambers JE (1990). Noncatalytic detoxication of six organophosphorus compounds by rat liver homogenates. *Pestic Biochem Physiol* **36**(3): 308-315.

Chanda SM, Harp P, Liu J and Pope CN (1995). Comparative developmental and maternal neurotoxicity following acute gestational exposure to chlorpyrifos in rats. *J Toxicol Environ Health* **44**(2): 189-202.

Chanda SM, Lassiter TL, Moser VC, Barone S and Padilla S (2002). Tissue Carboxylesterases and Chlorpyrifos Toxicity in the Developing Rat. *Human Ecol Risk Assess* **8**(1): 75-90.

Chanda SM and Pope CN (1996). Neurochemical and neurobehavioral effects of repeated gestational exposure to chlorpyrifos in maternal and developing rats. *Pharmacol Biochem Behav* **53**(4): 771-776.

Chen J, Kumar M, Chan W, Berkowitz G and Wetmur JG (2003). Increased influence of genetic variation on PON1 activity in neonates. *Environ Health Perspect* **111**(11): 1403-1409.

Chen WQ, Ma H, Bian JM, Zhang YZ and Li J (2012a). Hyper-phosphorylation of GSK-3 β : possible roles in chlorpyrifos-induced behavioral alterations in animal model of depression. *Neurosci Lett* **528**(2): 148-152.

Chen XP, Chen WZ, Wang FS and Liu JX (2012b: Cited as 2012 in USEPA 2014). Selective cognitive impairments are related to selective hippocampus and prefrontal cortex deficits after prenatal chlorpyrifos exposure. *Brain Res* **1474**: 19-28.

Chen XP, Wang X and Dong JY (2011). Different reaction patterns of dopamine content to prenatal exposure to chlorpyrifos in different periods. *J Appl Toxicol* **31**(4): 355-359.

Chiapella G, Flores-Martin J, Ridano ME, Reyna L, Magnarelli de Potas G, Panzetta-Dutari GM and Genti-Raimondi S (2013). The organophosphate chlorpyrifos disturbs redox balance and triggers antioxidant defense mechanisms in JEG-3 cells. *Placenta* **34**(9): 792-798.

Chiodo LM, Jacobson SW and Jacobson JL (2004). Neurodevelopmental effects of postnatal lead exposure at very low levels. *Neurotoxicol Teratol* **26**(3): 359-371.

Clancy B, Finlay BL, Darlington RB and Anand KJ (2007). Extrapolating brain development from experimental species to humans. *Neurotoxicology* **28**(5): 931-937.

Clayton CA, Pellizzari ED, Whitmore RW, Quakenboss JJ, Adgate J and Sefton K (2003). Distribution, associations, and partial aggregate exposure of pesticides and polynuclear aromatic hydrocarbons in the Minnesota Children's Pesticide Exposure Study (MNC PES). *Journal of Exposure Analysis and Environmental Epidemiology* **13**: 100-111.

Cole SR and Hernan MA (2002). Fallibility in estimating direct effects. *Int J Epidemiol* **31**(1): 163-165.

Cole TB, Fisher JC, Burbacher TM, Costa LG and Furlong CE (2012). Neurobehavioral assessment of mice following repeated postnatal exposure to chlorpyrifos-oxon. *Neurotoxicol Teratol* **34**(3): 311-322.

Cole TB, Jampsa RL, Walter BJ, Arndt TL, Richter RJ, Shih DM, Tward A, Lusi AJ, Jack RM, Costa LG and Furlong CE (2003). Expression of human paraoxonase (PON1) during development. *Pharmacogenetics* **13**(6): 357-364.

Costa LG, Giordano G, Cole TB, Marsillach J and Furlong CE (2013). Paraoxonase 1 (PON1) as a genetic determinant of susceptibility to organophosphate toxicity. *Toxicology* **307**: 115-122.

Crumpton TL, Seidler FJ and Slotkin TA (2000). Is oxidative stress involved in the developmental neurotoxicity of chlorpyrifos? *Brain Res Dev Brain Res* **121**(2): 189-195.

Dam K, Garcia SJ, Seidler FJ and Slotkin TA (1999). Neonatal chlorpyrifos exposure alters synaptic development and neuronal activity in cholinergic and catecholaminergic pathways. *Brain Res Dev Brain Res* **116**(1): 9-20.

Dam K, Seidler FJ and Slotkin TA (1998). Developmental neurotoxicity of chlorpyrifos: delayed targeting of DNA synthesis after repeated administration. *Brain Res Dev Brain Res* **108**(1-2): 39-45.

Dam K, Seidler FJ and Slotkin TA (2000). Chlorpyrifos exposure during a critical neonatal period elicits gender-selective deficits in the development of coordination skills and locomotor activity. *Brain Res Dev Brain Res* **121**(2): 179-187.

Das KP and Barone S, Jr. (1999). Neuronal differentiation in PC12 cells is inhibited by chlorpyrifos and its metabolites: is acetylcholinesterase inhibition the site of action? *Toxicol Appl Pharmacol* **160**(3): 217-230.

Deacon MM, Murray JS, Pilny MK, Dittenber DA, Hanley Jr TR and John JA (1979). The Effects of Orally Administered Chlorpyrifos on Embryonal and Fetal Development in Mice. Dow Chemical, Toxicology Research Lab., Midland, MI, 7/24/79; 342-254 036345.

Deacon MM, Murray JS, Pilny MK, Rao KS, Dittenber DA, Hanley TR, Jr. and John JA (1980). Embryotoxicity and fetotoxicity of orally administered chlorpyrifos in mice. *Toxicol Appl Pharmacol* **54**(1): 31-40.

Dobbing J and Sands J (1979). Comparative aspects of the brain growth spurt. *Early Hum Dev* **3**(1): 79-83.

Engel SM, Berkowitz GS, Barr DB, Teitelbaum SL, Siskind J, Meisel SJ, Wetmur JG and Wolff MS (2007). Prenatal organophosphate metabolite and organochlorine levels and performance on the Brazelton Neonatal Behavioral Assessment Scale in a multiethnic pregnancy cohort. *Am J Epidemiol* **165**(12): 1397-1404.

Engel SM, Bradman A, Wolff MS, Rauh VA, Harley KG, Yang JH, Hoepner LA, Dana Boyd B, Yolton K, Vedar MG, Xu Y, Hornung RW, Wetmur JG, Chen J, Holland NT, Perera FP, Whyatt RM, Lanphear BP and Eskenazi B (2016). Prenatal Organophosphorus Pesticide Exposure and Child Neurodevelopment at 24 Months: An Analysis of Four Birth Cohorts. *Environ Health Perspect* **124**(6): 822-830.

Engel SM, Wetmur J, Chen J, Zhu C, Barr DB, Canfield RL and Wolff MS (2011). Prenatal exposure to organophosphates, paraoxonase 1, and cognitive development in childhood. *Environ Health Perspect* **119**(8): 1182-1188.

Eskenazi B, Harley K, Bradman A, Weltzien E, Jewell NP, Barr DB, Furlong CE and Holland NT (2004). Association of in utero organophosphate pesticide exposure and

fetal growth and length of gestation in an agricultural population. *Environ Health Perspectives* **112**(10): 1116-1124.

Eskenazi B, Huen K, Marks A, Harley KG, Bradman A, Barr DB and Holland N (2010). PON1 and neurodevelopment in children from the CHAMACOS study exposed to organophosphate pesticides in utero. *Environ Health Perspect* **118**(12): 1775-1781.

Eskenazi B, Marks AR, Bradman A, Harley K, Barr DB, Johnson C, Morga N and Jewell NP (2007). Organophosphate pesticide exposure and neurodevelopment in young Mexican-American children. *Environ Health Perspect* **115**(5): 792-798.

Eskenazi B, Rosas LG, Marks AR, Bradman A, Harley K, Holland N, Johnson C, Fenster L and Barr DB (2008). Pesticide toxicity and the developing brain. *Basic Clin Pharmacol Toxicol* **102**(2): 228-236.

Farag AT, El Okazy AM and El-Aswed AF (2003). Developmental toxicity study of chlorpyrifos in rats. *Reprod Toxicol* **17**(2): 203-208.

Fenske RA, Black KG, Elkner KP, Lee CL, Methner MM and Soto R (1990). Potential exposure and health risks of infants following indoor residential pesticide applications. *Am J Public Health* **80**(6): 689-693.

Fillmore CM and Lessenger JE (1993). A cholinesterase testing program for pesticide applicators. *J Occup Med* **35**(1): 61-70.

Finlay BL and Darlington RB (1995). Linked regularities in the development and evolution of mammalian brains. *Science* **268**(5217): 1578-1584.

Flaskos J (2012). The developmental neurotoxicity of organophosphorus insecticides: a direct role for the oxon metabolites. *Toxicol Lett* **209**(1): 86-93.

Flaskos J, Nikolaidis E, Harris W, Sachana M and Hargreaves AJ (2011). Effects of sub-lethal neurite outgrowth inhibitory concentrations of chlorpyrifos oxon on cytoskeletal proteins and acetylcholinesterase in differentiating N2a cells. *Toxicol Appl Pharmacol* **256**(3): 330-336.

Fortenberry GZ, Meeker JD, Sanchez BN, Barr DB, Panuwet P, Bellinger D, Schnaas L, Solano-Gonzalez M, Ettinger AS, Hernandez-Avila M, Hu H and Tellez-Rojo MM (2014). Urinary 3,5,6-trichloro-2-pyridinol (TCPY) in pregnant women from Mexico City:

distribution, temporal variability, and relationship with child attention and hyperactivity. *Int J Hyg Environ Health* **217**(2-3): 405-412.

Frederick AL and Stanwood GD (2009). Drugs, biogenic amine targets and the developing brain. *Dev Neurosci* **31**(1-2): 7-22.

Fukushima N, Furuta D, Hidaka Y, Moriyama R and Tsujiuchi T (2009). Post-translational modifications of tubulin in the nervous system. *J Neurochem* **109**(3): 683-693.

Furlong CE, Cole TB, Jarvik GP, Pettan-Brewer C, Geiss GK, Richter RJ, Shih DM, Tward AD, Lusi AJ and Costa LG (2005). Role of paraoxonase (PON1) status in pesticide sensitivity: genetic and temporal determinants. *Neurotoxicology* **26**(4): 651-659.

Furlong MA, Engel SM, Barr DB and Wolff MS (2014). Prenatal exposure to organophosphate pesticides and reciprocal social behavior in childhood. *Environ Int* **70**: 125-131.

Garcia SJ, Seidler FJ, Crumpton TL and Slotkin TA (2001). Does the developmental neurotoxicity of chlorpyrifos involve glial targets? Macromolecule synthesis, adenylyl cyclase signaling, nuclear transcription factors, and formation of reactive oxygen in C6 glioma cells. *Brain Res* **891**(1-2): 54-68.

Garcia SJ, Seidler FJ and Slotkin TA (2003). Developmental neurotoxicity elicited by prenatal or postnatal chlorpyrifos exposure: effects on neurospecific proteins indicate changing vulnerabilities. *Environ Health Perspect* **111**(3): 297-303.

Gearhart DA, Sickles DW, Buccafusco JJ, Prendergast MA and Terry AV, Jr. (2007). Chlorpyrifos, chlorpyrifos-oxon, and diisopropylfluorophosphate inhibit kinesin-dependent microtubule motility. *Toxicol Appl Pharmacol* **218**(1): 20-29.

Geter DR, Kan HL, Lowe ER, Rick DL, Charles GD, Gollapudi BB and Mattsson JL (2008). Investigations of oxidative stress, antioxidant response, and protein binding in chlorpyrifos exposed rat neuronal PC12 cells. *Toxicol Mech Methods* **18**(1): 17-23.

Giordano G, Afsharinejad Z, Guizzetti M, Vitalone A, Kavanagh TJ and Costa LG (2007). Organophosphorus insecticides chlorpyrifos and diazinon and oxidative stress in neuronal cells in a genetic model of glutathione deficiency. *Toxicol Appl Pharmacol* **219**(2-3): 181-189.

Glantz LA, Gilmore JH, Hamer RM, Lieberman JA and Jarskog LF (2007). Synaptophysin and postsynaptic density protein 95 in the human prefrontal cortex from mid-gestation into early adulthood. *Neuroscience* **149**(3): 582-591.

Greenland S (1989). Modeling and variable selection in epidemiologic analysis. *Am J Public Health* **79**(3): 340-349.

Grigoryan H, Li B, Xue W, Grigoryan M, Schopfer LM and Lockridge O (2009). Mass spectral characterization of organophosphate-labeled lysine in peptides. *Anal Biochem* **394**(1): 92-100.

Grigoryan H and Lockridge O (2009). Nanoimages show disruption of tubulin polymerization by chlorpyrifos oxon: implications for neurotoxicity. *Toxicol Appl Pharmacol* **240**(2): 143-148.

Grigoryan H, Schopfer LM, Peeples ES, Duysen EG, Grigoryan M, Thompson CM and Lockridge O (2009). Mass spectrometry identifies multiple organophosphorylated sites on tubulin. *Toxicol Appl Pharmacol* **240**(2): 149-158.

Grigoryan H, Schopfer LM, Thompson CM, Terry AV, Masson P and Lockridge O (2008). Mass spectrometry identifies covalent binding of soman, sarin, chlorpyrifos oxon, diisopropyl fluorophosphate, and FP-biotin to tyrosines on tubulin: a potential mechanism of long term toxicity by organophosphorus agents. *Chem Biol Interact* **175**(1-3): 180-186.

Guodong D, Pei W, Ying T, Jun Z, Yu G, Xiaojin W, Rong S, Guoquan W and Xiaoming S (2012). Organophosphate pesticide exposure and neurodevelopment in young Shanghai children. *Environmental science & technology* **46**(5): 2911-2917.

Gurunathan S, Robson M, Freeman N, Buckley B, Roy A, Meyer R, Bukowski J and Liou PJ (1998). Accumulation of chlorpyrifos on residential surfaces and toys accessible to children. *Environ Health Perspect* **106**(1): 9-16.

Harley KG, Huen K, Aguilar Schall R, Holland NT, Bradman A, Barr DB and Eskenazi B (2011). Association of organophosphate pesticide exposure and paraoxonase with birth outcome in Mexican-American women. *PLoS One* **6**(8): e23923.

Haviland JA, Butz DE and Porter WP (2010). Long-term sex selective hormonal and behavior alterations in mice exposed to low doses of chlorpyrifos in utero. *Reprod Toxicol* **29**(1): 74-79.

Hirokawa N and Noda Y (2008). Intracellular transport and kinesin superfamily proteins, KIFs: structure, function, and dynamics. *Physiol Rev* **88**(3): 1089-1118.

Hirokawa N and Takemura R (2004). Molecular motors in neuronal development, intracellular transport and diseases. *Curr Opin Neurobiol* **14**(5): 564-573.

Hoberman AM (1998). Argus Research Laboratories, Inc. Developmental neurotoxicity study of chlorpyrifos administered orally via gavage to Crl:CD7 (SD) BR VAF/Plus 7 presumed pregnant rats. Horsham, PA.

Hohmann CF and Berger-Sweeney J (1998). Cholinergic regulation of cortical development and plasticity. New twists to an old story. *Perspect Dev Neurobiol* **5**(4): 401-425.

Holman E (2016). D432184. Summary Reviews for Additional Epidemiological Literature Studies from Prospective Birth Cohort Studies Washington, D.C.

Horton MK, Kahn LG, Perera F, Barr DB and Rauh V (2012). Does the home environment and the sex of the child modify the adverse effects of prenatal exposure to chlorpyrifos on child working memory? *Neurotoxicol Teratol* **34**(5): 534-541.

Howard AS, Bucelli R, Jett DA, Bruun D, Yang D and Lein PJ (2005). Chlorpyrifos exerts opposing effects on axonal and dendritic growth in primary neuronal cultures. *Toxicol Appl Pharmacol* **207**(2): 112-124.

Huen K, Bradman A, Harley K, Yousefi P, Boyd Barr D, Eskenazi B and Holland N (2012). Organophosphate pesticide levels in blood and urine of women and newborns living in an agricultural community. *Environ Res* **117**: 8-16.

Huff RA, Corcoran JJ, Anderson JK and Abou-Donia MB (1994). Chlorpyrifos oxon binds directly to muscarinic receptors and inhibits cAMP accumulation in rat striatum. *J Pharmacol Exp Ther* **269**(1): 329-335.

Hunter DL, Lassiter TL and Padilla S (1999). Gestational exposure to chlorpyrifos: comparative distribution of trichloropyridinol in the fetus and dam. *Toxicol Appl Pharmacol* **158**(1): 16-23.

Icenogle LM, Christopher NC, Blackwelder WP, Caldwell DP, Qiao D, Seidler FJ, Slotkin TA and Levin ED (2004). Behavioral alterations in adolescent and adult rats caused by a brief subtoxic exposure to chlorpyrifos during neurulation. *Neurotoxicol Teratol* **26**(1): 95-101.

Jacob SW and Herschler R (1983). INTRODUCTORY REMARKS: DIMETHYL SULFOXIDE AFTER TWENTY YEARS. *Ann NY Acad Sci* **411**(1): xiii-xvii.

Jacobson SM, Birkholz DA, McNamara ML, Bharate SB and George KM (2010). Subacute developmental exposure of zebrafish to the organophosphate pesticide metabolite, chlorpyrifos-oxon, results in defects in Rohon-Beard sensory neuron development. *Aquat Toxicol* **100**(1): 101-111.

Jameson RR, Seidler FJ, Qiao D and Slotkin TA (2006). Chlorpyrifos affects phenotypic outcomes in a model of mammalian neurodevelopment: critical stages targeting differentiation in PC12 cells. *Environ Health Perspect* **114**(5): 667-672.

Jett DA, Navoa RV, Beckles RA and McLemore GL (2001). Cognitive function and cholinergic neurochemistry in weanling rats exposed to chlorpyrifos. *Toxicol Appl Pharmacol* **174**(2): 89-98.

Jiang W, Duysen EG, Hansen H, Shlyakhtenko L, Schopfer LM and Lockridge O (2010). Mice treated with chlorpyrifos or chlorpyrifos oxon have organophosphorylated tubulin in the brain and disrupted microtubule structures, suggesting a role for tubulin in neurotoxicity associated with exposure to organophosphorus agents. *Toxicol Sci* **115**(1): 183-193.

Johnson FO, Chambers JE, Nail CA, Givaruangsawat S and Carr RL (2009). Developmental chlorpyrifos and methyl parathion exposure alters radial-arm maze performance in juvenile and adult rats. *Toxicol Sci* **109**(1): 132-142.

Kale M, Rathore N, John S and Bhatnagar D (1999). Lipid peroxidative damage on pyrethroid exposure and alterations in antioxidant status in rat erythrocytes: a possible involvement of reactive oxygen species. *Toxicol Lett* **105**(3): 197-205.

Kalender Y, Kaya S, Durak D, Uzun FG and Demir F (2012). Protective effects of catechin and quercetin on antioxidant status, lipid peroxidation and testis-histoarchitecture induced by chlorpyrifos in male rats. *Environ Toxicol Pharmacol* **33**(2): 141-148.

Karanth S and Pope C (2000). Carboxylesterase and A-esterase activities during maturation and aging: relationship to the toxicity of chlorpyrifos and parathion in rats. *Toxicol Sci* **58**(2): 282-289.

Katz EJ, Cortes VI, Eldefrawi ME and Eldefrawi AT (1997). Chlorpyrifos, parathion, and their oxons bind to and desensitize a nicotinic acetylcholine receptor: relevance to their toxicities. *Toxicol Appl Pharmacol* **146**(2): 227-236.

Ki YW, Park JH, Lee JE, Shin IC and Koh HC (2013). JNK and p38 MAPK regulate oxidative stress and the inflammatory response in chlorpyrifos-induced apoptosis. *Toxicol Lett* **218**(3): 235-245.

Kocsis JJ, Harkaway S, Santoyo MC and Snyder R (1968). Dimethyl sulfoxide: interactions with aromatic hydrocarbons. *Science* **160**(3826): 427-428.

Kousba AA, Sultatos LG, Poet TS and Timchalk C (2004). Comparison of chlorpyrifos-oxon and paraoxon acetylcholinesterase inhibition dynamics: potential role of a peripheral binding site. *Toxicol Sci* **80**(2): 239-248.

Krieger RI, Bernard CE, Dinoff TM, Ross JH and Williams RL (2001). Biomonitoring of persons exposed to insecticides used in residences. *Ann Occup Hyg* **45 Suppl 1**: S143-153.

Landrigan PJ (1990a). Health effects of environmental toxins in deficient housing. *Bull N Y Acad Med* **66**(5): 491-499.

Landrigan PJ (1990b). Housing and health: conclusions and challenges for the future. *Bull N Y Acad Med* **66**(5): 587-591.

Landrigan PJ, Claudio L, Markowitz SB, Berkowitz GS, Brenner BL, Romero H, Wetmur JG, Matte TD, Gore AC, Godbold JH and Wolff MS (1999). Pesticides and inner-city children: exposures, risks, and prevention. *Environ Health Perspect* **107**, **Suppl 3**: 431-437.

Lassiter TL, Padilla S, Mortensen SR, Chanda SM, Moser VC and Barone S, Jr. (1998). Gestational exposure to chlorpyrifos: apparent protection of the fetus? *Toxicol Appl Pharmacol* **152**(1): 56-65.

Lauder JM and Schambra UB (1999). Morphogenetic roles of acetylcholine. *Environ Health Perspect* **107 Suppl 1**: 65-69.

Laviola G, Adriani W, Gaudino C, Marino R and Keller F (2006). Paradoxical effects of prenatal acetylcholinesterase blockade on neuro-behavioral development and drug-induced stereotypies in reeler mutant mice. *Psychopharmacology* **187**(3): 331-344.

Layer PG and Willbold E (1995). Novel functions of cholinesterases in development, physiology and disease. *Prog Histochem Cytochem* **29**(3): 1-94.

Le Belle JE, Orozco NM, Paucar AA, Saxe JP, Mottahedeh J, Pyle AD, Wu H and Kornblum HI (2011). Proliferative neural stem cells have high endogenous ROS levels that regulate self-renewal and neurogenesis in a PI3K/Akt-dependant manner. *Cell stem cell* **8**(1): 59-71.

Lee JE, Park JH, Shin IC and Koh HC (2012). Reactive oxygen species regulated mitochondria-mediated apoptosis in PC12 cells exposed to chlorpyrifos. *Toxicol Appl Pharmacol* **263**(2): 148-162.

Levin ED, Addy N, Baruah A, Elias A, Christopher NC, Seidler FJ and Slotkin TA (2002). Prenatal chlorpyrifos exposure in rats causes persistent behavioral alterations. *Neurotoxicol Teratol* **24**(6): 733-741.

Levin ED, Addy N, Nakajima A, Christopher NC, Seidler FJ and Slotkin TA (2001). Persistent behavioral consequences of neonatal chlorpyrifos exposure in rats. *Brain Res Dev Brain Res* **130**(1): 83-89.

Levin ED, Cauley M, Johnson JE, Cooper EM, Stapleton HM, Ferguson PL, Seidler FJ and Slotkin TA (2014). Prenatal dexamethasone augments the neurobehavioral teratology of chlorpyrifos: significance for maternal stress and preterm labor. *Neurotoxicol Teratol* **41**: 35-42.

Li B, Schopfer LM, Grigoryan H, Thompson CM, Hinrichs SH, Masson P and Lockridge O (2009). Tyrosines of human and mouse transferrin covalently labeled by organophosphorus agents: a new motif for binding to proteins that have no active site serine. *Toxicol Sci* **107**(1): 144-155.

Li W and Casida JE (1998). Organophosphorus neuropathy target esterase inhibitors selectively block outgrowth of neurite-like and cell processes in cultured cells. *Toxicol Lett* **98**(3): 139-146.

Li Z, Dong T, Proschel C and Noble M (2007). Chemically diverse toxicants converge on Fyn and c-Cbl to disrupt precursor cell function. *PLoS Biol* **5**(2): e35.

Liu J, Olivier K and Pope CN (1999). Comparative neurochemical effects of repeated methyl parathion or chlorpyrifos exposures in neonatal and adult rats. *Toxicol Appl Pharmacol* **158**(2): 186-196.

Liu J and Pope CN (1996). Effects of chlorpyrifos on high-affinity choline uptake and [3H]hemicholinium-3 binding in rat brain. *Fundam Appl Toxicol* **34**(1): 84-90.

Liu J and Pope CN (1998). Comparative presynaptic neurochemical changes in rat striatum following exposure to chlorpyrifos or parathion. *J Toxicol Environ Health A* **53**(7): 531-544.

Lizardi PS, O'Rourke MK and Morris RJ (2008). The effects of organophosphate pesticide exposure on hispanic childrens cognitive and behavioral functioning. *Journal of Pediatric Psychology* **33**(1): 91-101.

Lovasi GS, Quinn JW, Rauh VA, Perera FP, Andrews HF, Garfinkel R, Hoepner L, Whyatt R and Rundle A (2011). Chlorpyrifos exposure and urban residential environment characteristics as determinants of early childhood neurodevelopment. *Am J Public Health* **101**(1): 63-70.

Lu C, Kedan G, Fisker-Andersen J, Kissel JC and Fenske RA (2004). Multipathway organophosphorus pesticide exposures of preschool children living in agricultural and nonagricultural communities. *Environ Res* **96**(3): 283-289.

MacIntosh DL, Kabiru C, Echols SL and Ryan PB (2001). Dietary exposure to chlorpyrifos and levels of 3,5,6-trichloro-2-pyridinol in urine. *J Expo Anal Environ Epidemiol* **11**(4): 279-285.

MacLusky NJ and Naftolin F (1981). Sexual differentiation of the central nervous system. *Science* **211**(4488): 1294-1302.

Mahjoubi-Samet A, Fetoui H, Jamoussi K, Chaabouni K, Ellouze F, Guermazi F and Zeghal N (2005). Impact of chlorpyrifos on cerebrum and cerebellum maturity in suckling rats. *Toxicol Environ Chem* **87**(4): 551-558.

Marks AR, Harley K, Bradman A, Kogut K, Barr DB, Johnson C, Calderon N and Eskenazi B (2010). Organophosphate pesticide exposure and attention in young Mexican-American children: the CHAMACOS study. *Environ Health Perspect* **118**(12): 1768-1774.

Marty MS, Domoradzki JY, Hansen SC, Timchalk C, Bartels MJ and Mattsson JL (2007). The effect of route, vehicle, and divided doses on the pharmacokinetics of chlorpyrifos and its metabolite trichloropyridinol in neonatal Sprague-Dawley rats. *Toxicol Sci* **100**(2): 360-373.

Mattsson JL, Maurissen JPJ, Nolan RJ and Brzak KA (2000). Lack of Differential Sensitivity to Cholinesterase Inhibition in Fetuses and Neonates Compared to Dams Treated Perinatally with Chlorpyrifos. *Toxicol Sci* **53**(2): 438-446.

Matus A (1988). Microtubule-associated proteins: their potential role in determining neuronal morphology. *Annu Rev Neurosci* **11**: 29-44.

Matus A (1990). Microtubule-associated proteins and the determination of neuronal form. *J Physiol (Paris)* **84**(1): 134-137.

Maurissen JP, Hoberman AM, Garman RH and Hanley TR, Jr. (2000). Lack of selective developmental neurotoxicity in rat pups from dams treated by gavage with chlorpyrifos. *Toxicol Sci* **57**(2): 250-263.

McCarthy MM (1994). Molecular aspects of sexual differentiation of the rodent brain. *Psychoneuroendocrinology* **19**(5-7): 415-427.

Meeker JD, Barr DB, Ryan L, Herrick RF, Bennett DH, Bravo R and Hauser R (2005). Temporal variability of urinary levels of nonpersistent insecticides in adult men. *J Expo Anal Environ Epidemiol* **15**(3): 271-281.

Meneguz A, Bisso GM and Michalek H (1989). Alterations in the distribution of cholinesterase molecular forms in maternal and fetal brain following diisopropyl fluorophosphate treatment of pregnant rats. *Neurochem Res* **14**(3): 285-291.

Meneguz A, Bisso GM and Michalek H (1992). Age-related changes in acetylcholinesterase and its molecular forms in various brain areas of rats. *Neurochem Res* **17**(8): 785-790.

Middlemore-Risher ML, Adam BL, Lambert NA and Terry AV, Jr. (2011). Effects of chlorpyrifos and chlorpyrifos-oxon on the dynamics and movement of mitochondria in rat cortical neurons. *J Pharmacol Exp Ther* **339**(2): 341-349.

Morgan MK, Sheldon LS, Croghan CW, Jones PA, Robertson GL, Chuang JC, Wilson NK and Lyu CW (2005). Exposures of preschool children to chlorpyrifos and its degradation product 3,5,6-trichloro-2-pyridinol in their everyday environments. *J Expo Anal Environ Epidemiol* **15**(4): 297-309.

Mortensen SR, Chanda SM, Hooper MJ and Padilla S (1996). Maturation differences in chlorpyrifos-oxonase activity may contribute to age-related sensitivity to chlorpyrifos. *J Biochem Toxicol* **11**(6): 279-287.

Moser VC, Chanda SM, Mortensen SR and Padilla S (1998). Age- and gender-related differences in sensitivity to chlorpyrifos in the rat reflect developmental profiles of esterase activities. *Toxicol Sci* **46**(2): 211-222.

Moser VC and Padilla S (1998). Age- and gender-related differences in the time course of behavioral and biochemical effects produced by oral chlorpyrifos in rats. *Toxicol Appl Pharmacol* **149**(1): 107-119.

Mullen BR, Khialeeva E, Hoffman DB, Ghiani CA and Carpenter EM (2013). Decreased reelin expression and organophosphate pesticide exposure alters mouse behaviour and brain morphology. *ASN Neuro* **5**(1): e00106.

Muscarella DE, Keown JF and Bloom SE (1984). Evaluation of the genotoxic and embryotoxic potential of chlorpyrifos and its metabolites in vivo and in vitro. *Environ Mutagen* **6**: 13-23.

Muto MA, Lobelle F, Jr., Bidanset JH and Wurpel JN (1992). Embryotoxicity and neurotoxicity in rats associated with prenatal exposure to DURSBN. *Vet Hum Toxicol* **34**(6): 498-501.

Naseh M, Vatanparast J, Baniyadi M and Hamidi GA (2013). Alterations in nitric oxide synthase-expressing neurons in the forebrain regions of rats after developmental exposure to organophosphates. *Neurotoxicol Teratol* **37**: 23-32.

Needham LL (2005). Assessing exposure to organophosphorus pesticides by biomonitoring in epidemiologic studies of birth outcomes. *Environ Health Perspect* **113**(4): 494-498.

Needham LL, Ozkaynak H, Whyatt RM, Barr DB, Wang RY, Naeher L, Akland G, Bahadori T, Bradman A, Fortmann R, Liu LJS, Morandi M, O'Rourke MK, Thomas K, Quackenboss J, Ryan PB and Zartarian V (2005). Exposure assessment in the National Children's Study: Introduction. *Environ Health Perspect* **113**(8): 1076-1082.

Nielsen S, Mueller BA, De Roos AJ, Viernes HM, Farin FM and Checkoway H (2005). Risk of brain tumors in children and susceptibility to organophosphorus insecticides: the potential role of paraoxonase (PON1). *Environ Health Perspect* **113**(7): 909-913.

Nolan RJ, Rick DL, Freshour NL and Saunders JH (1984). Chlorpyrifos: pharmacokinetics in human volunteers. *Toxicol Appl Pharmacol* **73**(1): 8-15.

Ohishi T, Wang L, Akane H, Itahashi M, Nakamura D, Yafune A, Mitsumori K and Shibutani M (2013). Reversible effect of maternal exposure to chlorpyrifos on the intermediate granule cell progenitors in the hippocampal dentate gyrus of rat offspring. *Reprod Toxicol* **35**: 125-136.

Ojha A and Srivastava N (2014). In vitro studies on organophosphate pesticides induced oxidative DNA damage in rat lymphocytes. *Mutat Res Genet Toxicol Environ Mutagen* **761**: 10-17.

Ostrea EM, Jr., Reyes A, Villanueva-Uy E, Pacifico R, Benitez B, Ramos E, Bernardo RC, Bielawski DM, Delaney-Black V, Chiodo L, Janisse JJ and Ager JW (2012). Fetal exposure to propoxur and abnormal child neurodevelopment at 2 years of age. *Neurotoxicology* **33**(4): 669-675.

Ouellette JH, Dittenber DA, Kloes PM and John JA (1983). Chlorpyrifos: Oral Teratology Study in Fischer 344 Rats. Toxicology Research Lab., Dow Chemical USA, Midland, MI, 7/5/83. 342-254 036344.

Oulhote Y and Bouchard MF (2013). Urinary metabolites of organophosphate and pyrethroid pesticides and behavioral problems in Canadian children. *Environ Health Perspect* **121**(11-12): 1378-1384.

Padilla S, Buzzard J and Moser VC (2000). Comparison of the role of esterases in the differential age-related sensitivity to chlorpyrifos and methamidophos. *Neurotoxicology* **21**(1-2): 49-56.

Pellegrini F and Budman DR (2005). Review: tubulin function, action of antitubulin drugs, and new drug development. *Cancer Invest* **23**(3): 264-273.

Perera FP, Rauh V, Tsai WY, Kinney P, Camann D, Barr D, Bernert T, Garfinkel R, Tu YH, Diaz D, Dietrich J and Whyatt RM (2003). Effects of transplacental exposure to environmental pollutants on birth outcomes in a multiethnic population. *Environ Health Perspect* **111**(2): 201-205.

Perera FP, Rauh V, Whyatt RM, Tsai WY, Bernert JT, Tu YH, Andrews H, Ramirez J, Qu LR and Tang DL (2004). Molecular evidence of an interaction between prenatal environmental exposures and birth outcomes in a multiethnic population. *Environ Health Perspect* **112**(5): 626-630.

Playfer JR, Eze LC, Bullen MF and Evans DA (1976). Genetic polymorphism and interethnic variability of plasma paroxonase activity. *Journal of Medical Genetics* **13**(5): 337-342.

Poojary A and Basha PM (2012). Cold stress interaction on organophosphate insecticide poisoning: age-related assessment in rat cerebral cortex. *Indian J Exp Biol* **50**(2): 110-116.

Pope CN (1999). Organophosphorus pesticides: do they all have the same mechanism of toxicity? *J Toxicol Environ Health B Crit Rev* **2**(2): 161-181.

Pope CN and Chakraborti TK (1992). Dose-related inhibition of brain and plasma cholinesterase in neonatal and adult rats following sublethal organophosphate exposures. *Toxicology* **73**(1): 35-43.

Pope CN, Chakraborti TK, Chapman ML, Farrar JD and Arthun D (1991). Comparison of in vivo cholinesterase inhibition in neonatal and adult rats by three organophosphorothioate insecticides. *Toxicology*. **68**: 51-61.

Prendergast MA, Self RL, Smith KJ, Ghayoumi L, Mullins MM, Butler TR, Buccafusco JJ, Gearhart DA and Terry AV, Jr. (2007). Microtubule-associated targets in chlorpyrifos oxon hippocampal neurotoxicity. *Neuroscience* **146**(1): 330-339.

Qiao D, Seidler FJ, Abreu-Villaca Y, Tate CA, Cousins MM and Slotkin TA (2004). Chlorpyrifos exposure during neurulation: cholinergic synaptic dysfunction and cellular alterations in brain regions at adolescence and adulthood. *Brain Res Dev Brain Res* **148**(1): 43-52.

Qiao D, Seidler FJ, Padilla S and Slotkin TA (2002). Developmental neurotoxicity of chlorpyrifos: what is the vulnerable period? *Environ Health Perspect* **110**: 1097-1103.

Qiao D, Seidler FJ and Slotkin TA (2001). Developmental neurotoxicity of chlorpyrifos modeled in vitro: comparative effects of metabolites and other cholinesterase inhibitors on DNA synthesis in PC12 and C6 cells. *Environ Health Perspect* **109**(9): 909-913.

Qiao D, Seidler FJ and Slotkin TA (2005). Oxidative mechanisms contributing to the developmental neurotoxicity of nicotine and chlorpyrifos. *Toxicol Appl Pharmacol* **206**(1): 17-26.

Qiao D, Seidler FJ, Tate CA, Cousins MM and Slotkin TA (2003). Fetal chlorpyrifos exposure: adverse effects on brain cell development and cholinergic biomarkers emerge postnatally and continue into adolescence and adulthood. *Environ Health Perspect* **111**(4): 536-544.

Quiros-Alcala L, Bradman A, Smith K, Weerasekera G, Odetokun M, Barr DB, Nishioka M, Castorina R, Hubbard AE, Nicas M, Hammond SK, McKone TE and Eskenazi B (2012). Organophosphorous pesticide breakdown products in house dust and children's urine. *J Expo Sci Environ Epidemiol* **22**(6): 559-568.

Quistad GB, Klintonberg R, Caboni P, Liang SN and Casida JE (2006). Monoacylglycerol lipase inhibition by organophosphorus compounds leads to elevation of brain 2-arachidonoylglycerol and the associated hypomotility in mice. *Toxicol Appl Pharmacol* **211**(1): 78-83.

Quistad GB, Nomura DK, Sparks SE, Segall Y and Casida JE (2002 cited as 2002a in USEPA 2014). Cannabinoid CB1 receptor as a target for chlorpyrifos oxon and other organophosphorus pesticides. *Toxicol Lett* **135**(1-2): 89-93.

Quistad GB, Sparks SE and Casida JE (2001). Fatty acid amide hydrolase inhibition by neurotoxic organophosphorus pesticides. *Toxicol Appl Pharmacol* **173**(1): 48-55.

Rauh V, Arunajadai S, Horton M, Perera F, Hoepner L, Barr DB and Whyatt R (2011). Seven-year neurodevelopmental scores and prenatal exposure to chlorpyrifos, a common agricultural pesticide. *Environ Health Perspect* **119**(8): 1196-1201.

Rauh VA, Garcia WE, Whyatt RM, Horton MK, Barr DB and Louis ED (2015). Prenatal exposure to the organophosphate pesticide chlorpyrifos and childhood tremor. *Neurotoxicology* **51**: 80-86.

Rauh VA, Garfinkel R, Perera FP, Andrews HF, Hoepner L, Barr DB, Whitehead R, Tang D and Whyatt RW (2006). Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. *Pediatrics* **118**(6): e1845-1859.

Rauh VA, Perera FP, Horton MK, Whyatt RM, Bansal R, Hao X, Liu J, Barr DB, Slotkin TA and Peterson BS (2012). Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A* **109**(20): 7871-7876.

Ray A, Liu J, Ayoubi P and Pope C (2010). Dose-related gene expression changes in forebrain following acute, low-level chlorpyrifos exposure in neonatal rats. *Toxicol Appl Pharmacol* **248**(2): 144-155.

Ray DE and Richards PG (2001). The potential for toxic effects of chronic, low-dose exposure to organophosphates. *Toxicol Lett* **120**(1-3): 343-351.

Resende RR and Adhikari A (2009). Cholinergic receptor pathways involved in apoptosis, cell proliferation and neuronal differentiation. *Cell Commun Signal* **7**: 20. Published online 2009 Aug 27. doi: 10.1186/1478-811X-7-20

Ricceri L, Markina N, Valanzano A, Fortuna S, Cometa MF, Meneguz A and Calamandrei G (2003). Developmental exposure to chlorpyrifos alters reactivity to environmental and social cues in adolescent mice. *Toxicol Appl Pharmacol* **191**(3): 189-201.

Ricceri L, Venerosi A, Capone F, Cometa MF, Lorenzini P, Fortuna S and Calamandrei G (2006). Developmental neurotoxicity of organophosphorous pesticides: Fetal and neonatal exposure to chlorpyrifos alters sex-specific behaviors at adulthood in mice. *Toxicol Sci* **93**(1): 105-113.

Rice D and Barone S, Jr. (2000). Critical periods of vulnerability for the developing nervous system: evidence from humans and animal models. *Environ Health Perspect* **108 Suppl 3**: 511-533.

Richardson J and Chambers J (2003). Effects of gestational exposure to chlorpyrifos on postnatal central and peripheral cholinergic neurochemistry. *J Toxicol Environ Health A* **66**(3): 275-289.

Richendrfer H, Pelkowski SD, Colwill RM and Creton R (2012). Developmental sub-chronic exposure to chlorpyrifos reduces anxiety-related behavior in zebrafish larvae. *Neurotoxicol Teratol* **34**(4): 458-465.

Rodier PM (2004). Environmental causes of central nervous system maldevelopment. *Pediatrics* **113**(4 Suppl): 1076-1083.

Romijn HJ, Hofman MA and Gramsbergen A (1991). At what age is the developing cerebral cortex of the rat comparable to that of the full-term newborn human baby? *Early Hum Dev* **26**(1): 61-67.

Roy TS, Sharma V, Seidler FJ and Slotkin TA (2005). Quantitative morphological assessment reveals neuronal and glial deficits in hippocampus after a brief subtoxic exposure to chlorpyrifos in neonatal rats. *Brain Res Dev Brain Res* **155**(1): 71-80.

Rubin LF (1975). Toxicity of dimethyl sulfoxide, alone and in combination. *Ann NY Acad Sci* **243**: 98-103.

Rubin Y, Gal N, Waner T and et al. (1987). Teratogenicity Study in the Rat. Life Science Research Israel Ltd., Makhteshim-Agan of North America Inc.

Ruckart PZ, Kakolewski K, Bove FJ and Kaye WE (2004). Long-term neurobehavioral health effects of methyl parathion exposure in children in Mississippi and Ohio. *Environ Health Perspect* **112**(1): 46-51.

Rull RP, Ritz B and Shaw GM (2006). Neural tube defects and maternal residential proximity to agricultural pesticide applications. *Am J Epidemiol* **163**(8): 743-753.

Russell RW and Overstreet DH (1987). Mechanisms underlying sensitivity to organophosphorus anticholinesterase compounds. *Prog Neurobiol* **28**(2): 97-129.

Sachana M, Flaskos J and Hargreaves AJ (2005). Effects of Chlorpyrifos and Chlorpyrifos-Methyl on the Outgrowth of Axon-Like Processes, Tubulin, and GAP-43 in N2a Cells. *Toxicol Mech Methods* **15**(6): 405-410.

Sachana M, Flaskos J, Sidiropoulou E, Yavari CA and Hargreaves AJ (2008). Inhibition of extension outgrowth in differentiating rat C6 glioma cells by chlorpyrifos and chlorpyrifos oxon: effects on microtubule proteins. *Toxicol In Vitro* **22**(5): 1387-1391.

Samarawickrema N, Pathmeswaran A, Wickremasinghe R, Peiris-John R, Karunaratna M, Buckley N, Dawson A and de Silva J (2008). Fetal effects of environmental exposure of pregnant women to organophosphorus compounds in a rural farming community in Sri Lanka. *Clin Toxicol (Phila)* **46**(6): 489-495.

Sams WM, Jr. (1967). The effects of dimethyl sulfoxide on nerve conduction. *Ann N Y Acad Sci* **141**(1): 242-247.

Sanchez C, Perez M and Avila J (2000). GSK3beta-mediated phosphorylation of the microtubule-associated protein 2C (MAP2C) prevents microtubule bundling. *Eur J Cell Biol* **79**(4): 252-260.

Saulsbury MD, Heyliger SO, Wang K and Johnson DJ (2009). Chlorpyrifos induces oxidative stress in oligodendrocyte progenitor cells. *Toxicology* **259**(1-2): 1-9.

Sawada M and Sato M (1975). The effect of dimethyl sulfoxide on the neuronal excitability and cholinergic transmission in Aplysia ganglion cells. *Ann N Y Acad Sci* **243**: 337-357.

Sebe A, Satar S, Alpay R, Kozaci N and Hilal A (2005). Organophosphate poisoning associated with fetal death: a case study. *Mt Sinai J Med.* **72**(5): 354-356.

Segall Y, Quistad GB, Sparks SE, Nomura DK and Casida JE (2003). Toxicological and structural features of organophosphorus and organosulfur cannabinoid CB1 receptor ligands. *Toxicol Sci* **76**(1): 131-137.

Shelton JF, Geraghty EM, Tancredi DJ, Delwiche LD, Schmidt RJ, Ritz B, Hansen RL and Hertz-Picciotto I (2014). Neurodevelopmental disorders and prenatal residential proximity to agricultural pesticides: the CHARGE study. *Environ Health Perspect* **122**(10): 1103-1109.

Sherman JD (1996). Chlorpyrifos (Dursban)-associated birth defects: report of four cases. *Arch Environ Health.* **51**(1): 5-8.

Shih DM, Gu L, Xia YR, Navab M, Li WF, Hama S, Castellani LW, Furlong CE, Costa LG, Fogelman AM and Lusis AJ (1998). Mice lacking serum paraoxonase are susceptible to organophosphate toxicity and atherosclerosis. *Nature* **394**(6690): 284-287.

Singh AK, Parashar A, Singh AK and Singh R (2013). Pre-natal/juvenile chlorpyrifos exposure associated with immunotoxicity in adulthood in Swiss albino mice. *J Immunotoxicol* **10**(2): 141-149.

Singh V and Panwar R (2014). In vivo antioxidative and neuroprotective effect of 4-Allyl-2-methoxyphenol against chlorpyrifos-induced neurotoxicity in rat brain. *Mol Cell Biochem* **388**(1-2): 61-74.

Slotkin TA (1999). Developmental cholinotoxicants: Nicotine and chlorpyrifos. *Environ Health Perspect* **107**(Suppl. 1): 71-80.

Slotkin TA, Card J and Seidler FJ (2012). Chlorpyrifos developmental neurotoxicity: interaction with glucocorticoids in PC12 cells. *Neurotoxicol Teratol* **34**(5): 505-512.

Slotkin TA, Cooper EM, Stapleton HM and Seidler FJ (2013). Does thyroid disruption contribute to the developmental neurotoxicity of chlorpyrifos? *Environ Toxicol Pharmacol* **36**(2): 284-287.

Slotkin TA, Cousins MM, Tate CA and Seidler FJ (2001). Persistent cholinergic presynaptic deficits after neonatal chlorpyrifos exposure. *Brain Res* **902**(2): 229-243.

Slotkin TA, MacKillop EA, Ryde IT and Seidler FJ (2007, cited as Slotkin & Seidler, 2007 and 2007a in USEPA 2014). Ameliorating the developmental neurotoxicity of chlorpyrifos: a mechanisms-based approach in PC12 cells. *Environ Health Perspect* **115**(9): 1306-1313.

Slotkin TA, Oliver CA and Seidler FJ (2005). Critical periods for the role of oxidative stress in the developmental neurotoxicity of chlorpyrifos and terbutaline, alone or in combination. *Brain Res Dev Brain Res* **157**(2): 172-180.

Slotkin TA and Seidler FJ (2005). The alterations in CNS serotonergic mechanisms caused by neonatal chlorpyrifos exposure are permanent. *Brain Res Dev Brain Res* **158**(1-2): 115-119.

Slotkin TA and Seidler FJ (2007a). Comparative developmental neurotoxicity of organophosphates in vivo: transcriptional responses of pathways for brain cell development, cell signaling, cytotoxicity and neurotransmitter systems. *Brain Res Bull* **72**(4-6): 232-274.

Slotkin TA and Seidler FJ (2007b). Developmental exposure to terbutaline and chlorpyrifos, separately or sequentially, elicits presynaptic serotonergic hyperactivity in juvenile and adolescent rats. *Brain Res Bull* **73**(4-6): 301-309.

Slotkin TA and Seidler FJ (2007c). Prenatal chlorpyrifos exposure elicits presynaptic serotonergic and dopaminergic hyperactivity at adolescence: critical periods for regional and sex-selective effects. *Reprod Toxicol* **23**(3): 421-427.

Slotkin TA and Seidler FJ (2012). Developmental neurotoxicity of organophosphates targets cell cycle and apoptosis, revealed by transcriptional profiles in vivo and in vitro. *Neurotoxicol Teratol* **34**(2): 232-241.

Slotkin TA, Tate CA, Cousins MM and Seidler FJ (2002). Functional alterations in CNS catecholamine systems in adolescence and adulthood after neonatal chlorpyrifos exposure. *Brain Res Dev Brain Res* **133**(2): 163-173.

Smulders CJ, Bueters TJ, Vailati S, van Kleef RG and Vijverberg HP (2004). Block of neuronal nicotinic acetylcholine receptors by organophosphate insecticides. *Toxicol Sci* **82**(2): 545-554.

Song X, Seidler FJ, Saleh JL, Zhang J, Padilla S and Slotkin TA (1997). Cellular mechanisms for developmental toxicity of chlorpyrifos: targeting the adenylyl cyclase signaling cascade. *Toxicol Appl Pharmacol* **145**(1): 158-174.

Song X, Violin JD, Seidler FJ and Slotkin TA (1998). Modeling the developmental neurotoxicity of chlorpyrifos in vitro: macromolecule synthesis in PC12 cells. *Toxicol Appl Pharmacol* **151**(1): 182-191.

Sotomayor V, Lascano C, de D'Angelo AM and Venturino A (2012). Developmental and polyamine metabolism alterations in *Rhinella arenarum* embryos exposed to the organophosphate chlorpyrifos. *Environ Toxicol Chem* **31**(9): 2052-2058.

Sternberg RJ, Grigorenko EL and Bundy DA (2001). The predictive value of IQ. *Merrill-Palmer Q* **47**(1): 1-41.

Tang J, Carr RL and Chambers JE (1999). Changes in rat brain cholinesterase activity and muscarinic receptor density during and after repeated oral exposure to chlorpyrifos in early postnatal development. *Toxicol Sci* **51**(2): 265-272.

Terry AV, Jr., Gearhart DA, Beck WD, Jr., Truan JN, Middlemore ML, Williamson LN, Bartlett MG, Prendergast MA, Sickles DW and Buccafusco JJ (2007). Chronic, intermittent exposure to chlorpyrifos in rats: protracted effects on axonal transport, neurotrophin receptors, cholinergic markers, and information processing. *J Pharmacol Exp Ther* **322**(3): 1117-1128.

Terry AV, Jr., Stone JD, Buccafusco JJ, Sickles DW, Sood A and Prendergast MA (2003). Repeated exposures to subthreshold doses of chlorpyrifos in rats: hippocampal damage, impaired axonal transport, and deficits in spatial learning. *J Pharmacol Exp Ther* **305**(1): 375-384.

Thompson BL and Stanwood GD (2009). Pleiotropic effects of neurotransmission during development: modulators of modularity. *J Autism Dev Disord* **39**(2): 260-268.

Thompson DJ, Gerbig CG and Warner SD (1971). Dow Chemical Company. Three Generation Reproduction and Teratology Study in the Rat Following Prolonged Dietary Exposure to Dursban O,O-Diethyl 0-3,5,6-trichloro-2pyridyl phosphorothioate.

Tian Y, Ishikawa H, Yamaguchi T, Yamauchi T and Yokoyama K (2005). Teratogenicity and developmental toxicity of chlorpyrifos. Maternal exposure during organogenesis in mice. *Reprod Toxicol* **20**(2): 267-270.

Tian Y and Yamauchi T (2003). Micronucleus formation in 3-day mouse embryos associated with maternal exposure to chlorpyrifos during the early preimplantation period. *Reprod Toxicol* **17**(4): 401-405.

Timchalk C, Kousba AA and Poet TS (2007). An age-dependent physiologically based pharmacokinetic/pharmacodynamic model for the organophosphorus insecticide chlorpyrifos in the preweanling rat. *Toxicol Sci* **98**(2): 348-365.

Timchalk C, Poet TS and Kousba AA (2006). Age-dependent pharmacokinetic and pharmacodynamic response in preweanling rats following oral exposure to the organophosphorus insecticide chlorpyrifos. *Toxicology* **220**(1): 13-25.

Turgeman G, Pinkas A, Slotkin TA, Tfilin M, Langford R and Yanai J (2011). Reversal of chlorpyrifos neurobehavioral teratogenicity in mice by allographic transplantation of adult subventricular zone-derived neural stem cells. *J Neurosci Res* **89**(8): 1185-1193.

US EPA (2000: cited in US EPA 2014 as 2000, cited in OEHHA 2008 as 2000b). Human Health Risk Assessment: Chlorpyrifos.

US EPA (2000a). Chlorpyrifos (Pc Code 059101) - Toxicology Chapter for Chlorpyrifos

US EPA (2011). Chlorpyrifos: Preliminary Human Health Risk Assessment for Registration Review. D388070

US EPA (2015). U.S. Environmental Protection Agency, D331251, 09/15/2015. Literature Review on Neurodevelopment Effects & FQPA Safety Factor Determination for the Organophosphate Pesticides.

Uggini GK, Patel PV and Balakrishnan S (2012). Embryotoxic and teratogenic effects of pesticides in chick embryos: a comparative study using two commercial formulations. *Environ Toxicol* **27**(3): 166-174.

Vallee RB, Williams JC, Varma D and Barnhart LE (2004). Dynein: An ancient motor protein involved in multiple modes of transport. *J Neurobiol* **58**(2): 189-200.

Vatanparast J, Naseh M, Baniasadi M and Haghdoust-Yazdi H (2013). Developmental exposure to chlorpyrifos and diazinon differentially affect passive avoidance performance and nitric oxide synthase-containing neurons in the basolateral complex of the amygdala. *Brain Res* **1494**: 17-27.

Venerosi A, Calamandrei G and Ricceri L (2006). A social recognition test for female mice reveals behavioral effects of developmental chlorpyrifos exposure. *Neurotoxicol Teratol* **28**(4): 466-471.

Venerosi A, Cutuli D, Colonnello V, Cardona D, Ricceri L and Calamandrei G (2008). Neonatal exposure to chlorpyrifos affects maternal responses and maternal aggression of female mice in adulthood. *Neurotoxicol Teratol* **30**(6): 468-474.

Venerosi A, Ricceri L, Rungi A, Sanghez V and Calamandrei G (2010). Gestational exposure to the organophosphate chlorpyrifos alters social-emotional behaviour and impairs responsiveness to the serotonin transporter inhibitor fluvoxamine in mice. *Psychopharmacology* **208**(1): 99-107.

Venerosi A, Ricceri L, Scattoni ML and Calamandrei G (2009). Prenatal chlorpyrifos exposure alters motor behavior and ultrasonic vocalization in CD-1 mouse pups. *Environ Health* **8**: 12. doi:10.1186/1476-069X-8-12.

Vidyasagar J, Karunakar N, Reddy MS, Rajnarayana K, Surender T and Krishna DR (2004). Oxidative stress and antioxidant status in acute organophosphorous insecticide poisoning. *Indian J Pharmacol* **36**(2): 76-79.

Vieira HL, Alves PM and Vercelli A (2011). Modulation of neuronal stem cell differentiation by hypoxia and reactive oxygen species. *Prog Neurobiol* **93**(3): 444-455.

Wang L, Ohishi T, Akane H, Shiraki A, Itahashi M, Mitsumori K and Shibutani M (2013). Reversible effect of developmental exposure to chlorpyrifos on late-stage neurogenesis in the hippocampal dentate gyrus in mouse offspring. *Reprod Toxicol* **38**: 25-36.

Ward TR, Ferris DJ, Tilson HA and Mundy WR (1993). Correlation of the anticholinesterase activity of a series of organophosphates with their ability to compete with agonist binding to muscarinic receptors. *Toxicol Appl Pharmacol* **122**(2): 300-307.

Ward TR and Mundy WR (1996). Organophosphorus compounds preferentially affect second messenger systems coupled to M2/M4 receptors in rat frontal cortex. *Brain Res Bull* **39**(1): 49-55.

Whitney KD, Seidler FJ and Slotkin TA (1995). Developmental neurotoxicity of chlorpyrifos: cellular mechanisms. *Toxicol Appl Pharmacol* **134**(1): 53-62.

WHO (2007). World Health Organization. WHO Specifications and Evaluations for Public Health Pesticides: Chlorpyrifos. from www.who.int/entity/whopes/quality/chlopyrifos_WHO_specs_eval_Aug_2007.pdf.

Whyatt RM, Barr DB, Camann DE, Kinney PL, Barr JR, Andrews HF, Hoepner LA, Garfinkel R, Hazi Y, Reyes A, Ramirez J, Cosme Y and Perera FP (2003). Contemporary-use pesticides in personal air samples during pregnancy and blood samples at delivery among urban minority mothers and newborns. *Environ Health Perspect* **111**(5): 749-756.

Whyatt RM, Camann DE, Kinney PL, Reyes A, Ramirez J, Dietrich J, Diaz D, Holmes D and Perera FP (2002). Residential pesticide use during pregnancy among a cohort of urban minority women. *Environ Health Perspect* **110**(5): 507-514.

Whyatt RM, Camann D, Perera FP, Rauh VA, Tang D, Kinney PL, Garfinkel R, Andrews H, Hoepner L and Barr DB (2005). Biomarkers in assessing residential insecticide exposures during pregnancy and effects on fetal growth. *Toxicol Appl Pharmacol* **206**(2): 246-254.

Whyatt RM, Garfinkel R, Hoepner LA, Andrews H, Holmes D, Williams MK, Reyes A, Diaz D, Perera FP, Camann DE and Barr DB (2009). A biomarker validation study of prenatal chlorpyrifos exposure within an inner-city cohort during pregnancy. *Environ Health Perspect* **117**(4): 559-567.

Whyatt RM, Garfinkel R, Hoepner LA, Holmes D, Borjas M, Williams MK, Reyes A, Rauh V, Perera FP and Camann DE (2007). Within- and between-home variability in indoor-air insecticide levels during pregnancy among an inner-city cohort from New York City. *Environ Health Perspect* **115**(3): 383-389.

Whyatt RM, Rauh V, Barr DB, Camann DE, Andrews HF, Garfinkel R, Hoepner LA, Diaz D, Dietrich J, Reyes A, Tang D, Kinney PL and Perera FP (2004). Prenatal insecticide exposures and birth weight and length among an urban minority cohort. *Environ Health Perspect* **112**(10): 1125-1132.

Wilson NK, Chuang JC, Lyu C, Menton R and Morgan MK (2003). Aggregate exposures of nine preschool children to persistent organic pollutants at day care and at home. *J Expo Anal Environ Epidemiol* **13**(3): 187-202.

Wolff MS, Engel S, Berkowitz G, Teitelbaum S, Siskind J, Barr DB and Wetmur J (2007). Prenatal pesticide and PCB exposures and birth outcomes. *Pediatr Res* **61**(2): 243-250.

Wright JP, Dietrich KN, Ris MD, Hornung RW, Wessel SD, Lanphear BP, Ho M and Rae MN (2008). Association of prenatal and childhood blood lead concentrations with criminal arrests in early adulthood. *PLoS Med* **5**(5): e101.

Xu F, Chang X, Lou D, Wu Q and Zhou Z (2012). Chlorpyrifos exposure causes alternation in dopamine metabolism in PC12 cells. *Toxicol Mech Methods* **22**(4): 309-314.

Yang D, Howard A, Bruun D, Ajua-Alemanj M, Pickart C and Lein PJ (2008). Chlorpyrifos and chlorpyrifos-oxon inhibit axonal growth by interfering with the morphogenic activity of acetylcholinesterase. *Toxicol Appl Pharmacol* **228**(1): 32-41.

Yang D, Lauridsen H, Buels K, Chi LH, La Du J, Bruun DA, Olson JR, Tanguay RL and Lein PJ (2011). Chlorpyrifos-oxon disrupts zebrafish axonal growth and motor behavior. *Toxicol Sci* **121**(1): 146-159.

Young JG, Eskenazi B, Gladstone EA, Bradman A, Pedersen L, Johnson C, Barr DB, Furlong CE and Holland NT (2005). Association between in utero organophosphate pesticide exposure and abnormal reflexes in neonates. *Neurotoxicology* **26**(2): 199-209.

Young JT and Grandjean M (1988). The Dow Chemical Company. Chlorpyrifos: 2-year dietary chronic toxicity-oncogenicity study in fischer-344 rats. 1. Texas Lake Jackson Research Center. Freeport, Texas 77541.

Zahalka EA, Seidler FJ, Lappi SE, McCook EC, Yanai J and Slotkin TA (1992). Deficits in development of central cholinergic pathways caused by fetal nicotine exposure: differential effects on choline acetyltransferase activity and [3H]hemicholinium-3 binding. *Neurotoxicol Teratol* **14**(6): 375-382.

Zhang J, Zhao LL, Hu ZP, Zhou J, Deng L, Gu F, Dai HM and Huang M (2011). [Effects of low-dose chlorpyrifos exposure on dopaminergic neurons in the midbrain substantia nigra and neural behavioral development in neonatal rats]. *Zhongguo Dang Dai Er Ke Za Zhi* **13**(12): 989-994.

Zhang Y, Han S, Liang D, Shi X, Wang F, Liu W, Zhang L, Chen L, Gu Y and Tian Y (2014). Prenatal exposure to organophosphate pesticides and neurobehavioral development of neonates: a birth cohort study in Shenyang, China. *PLoS One* **9**(2): e88491.

Zheng Q, Olivier K, Won YK and Pope CN (2000). Comparative cholinergic neurotoxicity of oral chlorpyrifos exposures in preweanling and adult rats. *Toxicol Sci* **55**(1): 124-132.