

## Chapter 5. Metals – Mercury, Arsenic, Cadmium, and Manganese

1. Abernathy CO, Liu YP, Longfellow D, Aposhian HV, Beck B, Fowler B, Goyer R, Menzer R, Rossman T, Thompson C and others. 1999. Arsenic: health effects, mechanisms of actions, and research issues. *Environ Health Perspect* 107:593-7.
2. Agency for Toxic Substances and Disease Registry. 1999a. Toxicological profile for cadmium [Web Page]. Located at: <http://www.atsdr.cdc.gov/toxprofiles/tp5.html>.
3. Agency for Toxic Substances and Disease Registry. 1999b. Toxicological profile for mercury (update) [Web Page]. Located at: <http://www.atsdr.cdc.gov/toxprofiles/tp46.html>.
4. Agency for Toxic Substances and Disease Registry. 2000a. Toxicological profile for arsenic [Web Page]. Located at: <http://www.atsdr.cdc.gov/toxprofiles/tp2.html>.
5. Agency for Toxic Substances and Disease Registry. 2000b. Toxicological profile for manganese [Web Page]. Located at: <http://www.atsdr.cdc.gov/toxprofiles/tp151.html>.
6. Agocs MM, Etzel RA, Parrish RG, Paschal DC, Campagna PR, Cohen DS, Kilbourne EM, Hesse JL. 1990. Mercury exposure from interior latex paint. *N Engl J Med* 323:1096-101.
7. Ahmad SA, Sayed MH, Barua S, Khan MH, Faruquee MH, Jalil A, Hadi SA, Talukder HK. 2001. Arsenic in drinking water and pregnancy outcomes. *Environ Health Perspect* 109:629-31.
8. Akagi H, Grandjean P, Takizawa Y, Weihe P. 1998. Methylmercury dose estimation from umbilical cord concentrations in patients with Minamata disease. *Environ Res* 77:98-103.
9. Altenkirch H, Stoltenburg-Didinger G, Koeppel C. 1988. The neurotoxicological aspects of the toxic oil syndrome (TOS) in Spain. *Toxicology* 49:25-34.
10. Amin-zaki L, Majeed MA, Clarkson TW, Greenwood MR. 1978. Methylmercury poisoning in Iraqi children: clinical observations over two years. *Br Med J* 1:613-6.
11. Amin-Zaki L, Majeed MA, Elhassani SB, Clarkson TW, Greenwood MR, Doherty RA. 1979. Prenatal methylmercury poisoning. Clinical observations over five years. *Am J Dis Child* 133:172-7.
12. Annau Z, Cuomo V. 1988. Mechanisms of neurotoxicity and their relationship to behavioral changes. *Toxicology* 49:219-25.
13. Aschengrau A, Zierler S, Cohen A. 1989. Quality of community drinking water and the occurrence of spontaneous abortion. *Arch Environ Health* 44:283-90.
14. Aschner M. 1997. Astrocyte metallothioneins (MTs) and their neuroprotective role. *Ann N Y Acad Sci* 825:334-47.
15. Aschner M. 2000. Manganese: brain transport and emerging research needs. *Environ Health Perspect* 108 Suppl 3:429-32.
16. Aschner M, Gannon M, Kimelberg HK. 1992. Manganese uptake and efflux in cultured rat astrocytes. *J Neurochem* 58:730-5.
17. Aschner M, Vrana KE, Zheng W. 1999. Manganese uptake and distribution in the central nervous system (CNS). *Neurotoxicology* 20:173-80.
18. Audesirk G, Armstrong D, van den Maagdenberg AMJM, Atchison W, Shafer T, Fletcher C. 2000. Calcium channels: critical targets of toxicants and diseases. *Environ Health Perspect* 108:1215-18.
19. Axtell CD, Cox C, Myers GJ, Davidson PW, Choi AL, Cernichiari E, Sloane-Reeves J, Shamlaye CF, Clarkson TW. 2000. Association between methylmercury exposure from fish consumption and child development at five and a half

years of age in the Seychelles Child Development Study: an evaluation of nonlinear relationships. *Environ Res* 84:71-80.

20. Axtell CD, Myers GJ, Davidson PW, Choi AL, Cernichiari E, Sloane-Reeves J, Cox C, Shamlaye C, Clarkson TW. 1998. Semiparametric modeling of age at achieving developmental milestones after prenatal exposure to methylmercury in the Seychelles child development study. *Environ Health Perspect* 106:559-63.
21. Baker EL Jr, Hayes CG, Landrigan PJ, Handke JL, Leger RT, Housworth WJ, Harrington JM. 1977. A nationwide survey of heavy metal absorption in children living near primary copper, lead, and zinc smelters. *Am J Epidemiol* 106:261-73.
22. Benes B, Spevackova V, Smid J, Cejchanova M, Cerna M, Subrt P, Marecek J. 2000. The concentration levels of Cd, Pb, Hg, Cu, Zn and Se in blood of the population in the Czech Republic. *Cent Eur J Public Health* 8:117-9.
23. Benoit JM, Fitzgerald WF, Damman AW. 1998. The biogeochemistry of an ombrotrophic bog: evaluation of use as an archive of atmosphere mercury deposition. *Environ Res* 78:118-33.
24. Beusterien KM, Etzel RA, Agocs MM, Egeland GM, Socie EM, Rouse MA, Mortensen BK. 1991. Indoor air mercury concentrations following application of interior latex paint. *Arch Environ Contam Toxicol* 21:62-4.
25. Beuter A, Edwards R, deGeoffroy A, Mergler D, Hundnell K. 1999. Quantification of neuromotor function for detection of the effects of manganese. *Neurotoxicology* 20:355-66.
26. Beyersmann D, Hechtenberg S. 1997. Cadmium, gene regulation, and cellular signalling in mammalian cells. *Toxicol Appl Pharmacol* 144:247-61.
27. Bird ED, Anton AH, Bullock B. 1984. The effect of manganese inhalation on basal ganglia dopamine concentrations in rhesus monkey. *Neurotoxicology* 5:59-65.
28. Bonithon-Kopp C, Huel G, Moreau T, Wendling R. 1986. Prenatal exposure to lead and cadmium and psychomotor development of the child at 6 years. *Neurobehav Toxicol Teratol* 8:307-10.
29. Brouwer OF, Onkenhout W, Edelbroek PM, de Kom JF, de Wolff FA, Peters AC. 1992. Increased neurotoxicity of arsenic in methylenetetrahydrofolate reductase deficiency. *Clin Neurol Neurosurg* 94:307-10.
30. Budtz-Jorgensen E, Grandjean P, Keiding N, White RF, Weihe P. 2000. Benchmark dose calculations of methylmercury-associated neurobehavioural deficits. *Toxicol Lett* 112-113:193-9.
31. Budtz-Jorgensen E, Keiding N, Grandjean P, White R, Weihe P. 1999. Methylmercury neurotoxicity independent of PCB exposure. *Environ Health Perspect* 107:7-9.
32. Calderon RL, Hudgens E, Le XC, Schreinemachers D, Thomas DJ. 1999. Excretion of arsenic in urine as a function of exposure to arsenic in drinking water. *Environ Health Perspect* 107:663-7.
33. Cawte J, Kilburn C, Florence M. 1989. Motor neurone disease of the western Pacific: do the foci extend to Australia? *Neurotoxicology* 10:263-70.
34. Center for Food Safety and Applied Nutrition UF. 2001 Mar. An important message for pregnant women and women of childbearing age who may become pregnant about the risks of mercury in fish [Web Page]. Located at: <http://vm.cfsan.fda.gov/~dms/admehg.html>.
35. Centers for Disease Control and Prevention. 1995. Mercury exposure in a residential community--Florida, 1994. *MMWR Morb Mortal Wkly Rep* 44:436-7, 443.
36. Centers for Disease Control and Prevention. 1996a. Update: Mercury poisoning associated with beauty cream - Arizona, California, New Mexico, and Texas, 1996. *MMWR* 45:633-5.
37. Centers for Disease Control and Prevention. 1996b. Mercury exposure among residents of a building formerly used for

industrial purposes--New Jersey, 1995. MMWR 45:422-4.

38. Centers for Disease Control and Prevention. 2000. Summary of the joint statement on thimerosal in vaccines. American Academy of Family Physicians, American Academy of Pediatrics, Advisory Committee on Immunization Practices, Public Health Service. MMWR 49:622, 631.
39. Centers for Disease Control and Prevention. 2001. National report on human exposure to environmental chemicals [Web Page]. Located at: <http://www.cdc.gov/nceh/dls/report/PDF/CompleteReport.pdf>.
40. Chou WC, Hawkins AL, Barrett JF, Griffin CA, Dang CV. 2001. Arsenic inhibition of telomerase transcription leads to genetic instability. *J Clin Invest* 108:1541-7.
41. Concha G, Vogler G, Lezcano D, Nermell B, Vahter M. 1998. Exposure to inorganic arsenic metabolites during early human development. *Toxicol Sci* 44:185-90.
42. Crump KS. 2000. Manganese exposures in Toronto during use of the gasoline additive, methylcyclopentadienyl manganese tricarbonyl. *J Expo Anal Environ Epidemiol* 10:227-39.
43. Crump KS, Van Landingham C, Shamlaye C, Cox C, Davidson PW, Myers GJ, Clarkson TW. 2000. Benchmark concentrations for methylmercury obtained from the Seychelles Child Development Study. *Environ Health Perspect* 108:257-63.
44. Dabeka RW, McKenzie AD, Lacroix GM, Cleroux C, Bowe S, Graham RA, Conacher HB, Verdier P. 1993. Survey of arsenic in total diet food composites and estimation of the dietary intake of arsenic by Canadian adults and children. *J AOAC Int* 76:14-25.
45. Dalgard C, Grandjean P, Jorgensen PJ, Weihe P. 1994. Mercury in the umbilical cord: implications for risk assessment for Minamata disease. *Environ Health Perspect* 102:548-50.
46. Davidson PW, Myers GJ, Cox C, Axtell C, Shamlaye C, Sloane-Reeves J, Cernichiari E, Needham L, Choi A, Wang Y and others. 1998. Effects of prenatal and postnatal methylmercury exposure from fish consumption on neurodevelopment: outcomes at 66 months of age in the Seychelles Child Development Study. *JAMA* 280:701-7.
47. Davidson PW, Myers GJ, Cox C, Shamlaye CF, Marsh DO, Tanner MA, Berlin M, Sloane-Reeves J, Cernichiari E, Choisy O and others. 1995. Longitudinal neurodevelopmental study of Seychellois children following in utero exposure to methylmercury from maternal fish ingestion: outcomes at 19 and 29 months. *Neurotoxicology* 16:677-88.
48. Davis JM. 1999. Inhalation health risks of manganese: an EPA perspective. *Neurotoxicology* 20:511-8.
49. De Flora S, Bennicelli C, Bagnasco M. 1994. Genotoxicity of mercury compounds. A review. *Mutat Res* 317:57-79.
50. Diamond GL, Zalups RK. 1998. Understanding renal toxicity of heavy metals. *Toxicol Pathol* 26:92-103.
51. Dorman DC, Struve MF, Vitarella D, Byerly FL, Goetz J, Miller R. 2000. Neurotoxicity of manganese chloride in neonatal and adult CD rats following subchronic (21-day) high-dose oral exposure. *J Appl Toxicol* 20:179-87.
52. Dorner K, Dziadzka S, Hohn A, Sievers E, Oldigs HD, Schulz-Lell G, Schaub J. 1989. Longitudinal manganese and copper balances in young infants and preterm infants fed on breast-milk and adapted cow's milk formulas. *Br J Nutr* 61:559-72.
53. Dulout FN, Grillo CA, Seoane AI, Maderna CR, Nilsson R, Vahter M, Darroudi F, Natarajan AT. 1996. Chromosomal aberrations in peripheral blood lymphocytes from Native Andean women and children from northwestern Argentina exposed to arsenic in drinking water. *Mutat Res* 370:151-8.
54. Dumont C, Girard M, Bellavance F, Noel F. 1998. Mercury levels in the Cree population of James Bay, Quebec, from 1988 to 1993/94. *CMAJ* 158:1439-45.
55. Eklund G, Oskarsson A. 1999. Exposure of cadmium from infant formulas and weaning foods. *Food Addit Contam*

16:509-19.

56. Evans J, Hastings L. 1992. Accumulation of Cd(II) in the CNS depending on the route of administration: intraperitoneal, intratracheal, or intranasal. *Fundam Appl Toxicol* 19:275-8.
57. Fell JM, Reynolds AP, Meadows N, Khan K, Long SG, Quaghebeur G, Taylor WJ, Milla PJ. 1996. Manganese toxicity in children receiving long-term parenteral nutrition. *Lancet* 347:1218-21.
58. Fessenden JD, Chen L, Wang Y, Paolini C, Franzini-Armstrong C, Allen PD, Pessah IN. 2001. Ryanodine receptor point mutant E4032A reveals an allosteric interaction with ryanodine. *Proc Natl Acad Sci USA* 98:2865-70.
59. Forman J, Moline J, Cernichiari E, Sayegh S, Torres JC, Landrigan MM, Hudson J, Adel HN, Landrigan PJ. 2000. A cluster of pediatric metallic mercury exposure cases treated with meso-2,3-dimercaptosuccinic acid (DMSA). *Environ Health Perspect* 108:575-7.
60. Friis L, Petersson L, Edling C. 1998. Reduced cadmium levels in human kidney cortex in Sweden. *Environ Health Perspect* . 106:175-8.
61. Gilbert SG, Grant-Webster KS. 1995. Neurobehavioral effects of developmental methylmercury exposure. *Environ Health Perspect* 103 Suppl 6:135-42.
62. Goering PL, Aposhian HV, Mass MJ, Cebrian M, Beck BD, Waalkes MP. 1999. The enigma of arsenic carcinogenesis: role of metabolism. *Toxicol Sci* 49:5-14.
63. Goldman LR. 1995. Case studies of environmental risks to children. *Future Child* 5:27-33.
64. Golub MS, Macintosh MS, Baumrind N. 1998. Developmental and reproductive toxicity of inorganic arsenic: animal studies and human concerns. *J Toxicol Environ Health B Crit Rev* 1:199-241.
65. Gotelli CA, Astolfi E, Cox C, Cernichiari E, Clarkson TW. 1985. Early biochemical effects of an organic mercury fungicide on infants: "dose makes the poison". *Science* 227:638-40.
66. Goyer RA. 1990. Environmentally related diseases of the urinary tract. *Med Clin North Am* 74:377-89.
67. Grandjean P. 1997. Mercurial uncertainties in environmental health. *Ann N Y Acad Sci* 837:239-45.
68. Grandjean P, Budtz-Jorgensen E, White RF, Jorgensen PJ, Weihe P, Debes F, Keiding N. 1999. Methylmercury exposure biomarkers as indicators of neurotoxicity in children aged 7 years. *Am J Epidemiol* 150:301-5.
69. Grandjean P, Weihe P, Burse VW, Needham LL, Storr-Hansen E, Heinzow B, Debes F, Murata K, Simonsen H, Ellefsen P and others. 2001. Neurobehavioral deficits associated with PCB in 7-year-old children prenatally exposed to seafood neurotoxicants. *Neurotoxicol Teratol* 23:305-17.
70. Grandjean P, Weihe P, Jorgensen PJ, Clarkson T, Cernichiari E, Videro T. 1992. Impact of maternal seafood diet on fetal exposure to mercury, selenium, and lead. *Arch Environ Health* 47:185-95.
71. Grandjean P, Weihe P, White RF. 1995. Milestone development in infants exposed to methylmercury from human milk. *Neurotoxicology* 16:27-33.
72. Grandjean P, Weihe P, White RF, Debes F. 1998. Cognitive performance of children prenatally exposed to "safe" levels of methylmercury. *Environ Res* 77:165-72.
73. Grandjean P, Weihe P, White RF, Debes F, Araki S, Yokoyama K, Murata K, Sorensen N, Dahl R, Jorgensen PJ. 1997. Cognitive deficit in 7-year-old children with prenatal exposure to methylmercury. *Neurotoxicol Teratol* 19:417-28.
74. Gunderson VM, Grant-Webster KS, Burbacher TM, Mottet NK. 1988. Visual recognition memory deficits in methylmercury-exposed *Macaca fascicularis* infants. *Neurotoxicol Teratol* 10:373-9.

75. Harada M. 1977. Congenital Minamata disease. In *Minimata Disease: Methylmercury poisoning in Minimata and Niigata, Japan*, edited by Tsubaki R and Irukayama K. New York, pp 209-239: Elsevier Scientific Publishing Company.
76. Harada M. 1995. Minamata disease: methylmercury poisoning in Japan caused by environmental pollution. *Crit Rev Toxicol* 25:1-24.
77. Hartwell TD, Handy RW, Harris BS, Williams SR, Gehlbach SH. 1983. Heavy metal exposure in populations living around zinc and copper smelters. *Arch Environ Health* 38:284-95.
78. Hartwig A. 1998. Carcinogenicity of metal compounds: possible role of DNA repair inhibition. *Toxicol Lett* 102-103:235-9.
79. He P, Liu DH, Zhang GQ. 1994. Effects of high-level-manganese sewage irrigation on children's neurobehavior. *Chung Hua Yu Fang I Hsueh Tsa Chih* 28:216-8.
80. Hopenhayn-Rich C, Browning SR, Hertz-Picciotto I, Ferreccio C, Peralta C, Gibb H. 2000. Chronic arsenic exposure and risk of infant mortality in two areas of Chile. *Environ Health Perspect* 108:667-73.
81. Hunter D. 1969. *The Disease of Occupations*. 5th ed. London: English Universities Press.
82. Ihrig MM, Shalat SL, Baynes C. 1998. A hospital-based case-control study of stillbirths and environmental exposure to arsenic using an atmospheric dispersion model linked to a geographical information system. *Epidemiology* 9:290-4.
83. Ikeda M, Zhang ZW, Moon CS, Shimbo S, Watanabe T, Nakatsuka H, Matsuda-Inoguchi N, Higashikawa K. 2000a. Possible effects of environmental cadmium exposure on kidney function in the Japanese general population. *Int Arch Occup Environ Health* 73:15-25.
84. Ikeda M, Zhang ZW, Shimbo S, Watanabe T, Nakatsuka H, Moon CS, Matsuda-Inoguchi N, Higashikawa K. 2000b. Urban population exposure to lead and cadmium in east and south-east Asia. *Sci Total Environ* 249:373-84.
85. International Agency for Research on Cancer. 1980. IARC monographs on the evaluation of carcinogenic risks to humans. Vol. 23. Arsenic and arsenic compounds. Lyon, France.
86. International Agency for Research on Cancer. 1994. Beryllium, cadmium, mercury, and exposures in the glass manufacturing industry. Volume 58 ed. Lyon, France.
87. Iwata K, Saito H, Moriyama M, Nakano A. 1993. Renal tubular function after reduction of environmental cadmium exposure: a ten-year follow-up. *Arch Environ Health* 48:157-63.
88. Jarup L, Berglund M, Elinder CG, Nordberg G, Vahter M. 1998. Health effects of cadmium exposure--a review of the literature and a risk estimate. *Scand J Work Environ Health* 24 Suppl 1:1-51.
89. Jin T, Lu J, Nordberg M. 1998. Toxicokinetics and biochemistry of cadmium with special emphasis on the role of metallothionein. *Neurotoxicology* 19:529-35.
90. Johansen P, Pars T, Bjerregaard P. 2000. Lead, cadmium, mercury and selenium intake by Greenlanders from local marine food. *Sci Total Environ* 245:187-94.
91. Jokstad A, Thomassen Y, Bye E, Clench-Aas J, Aaseth J. 1992. Dental amalgam and mercury. *Pharmacol Toxicol* 70:308-13.
92. Jorhem L, Slorach S, Sundstrom B, Ohlin B. 1991. Lead, cadmium, arsenic and mercury in meat, liver and kidney of Swedish pigs and cattle in 1984-88. *Food Addit Contam* 8:201-11.
93. Kenyon EM, Hughes MF. 2001. A concise review of the toxicity and carcinogenicity of dimethylarsinic acid. *Toxicology* 160:227-36.

94. Kiely PD, Thiru S, Oliveira DB. 1995. Inflammatory polyarthritis induced by mercuric chloride in the Brown Norway rat. *Lab Invest* 73:284-93.
95. Kim C, Chan HM, Receveur O. 1998. Risk assessment of cadmium exposure in Fort Resolution, Northwest Territories, Canada. *Food Addit Contam* 15. 15:307-17.
96. Klaassen CD, Liu J, Choudhuri S. 1999. Metallothionein: an intracellular protein to protect against cadmium toxicity. *Annu Rev Pharmacol Toxicol* 39:267-94.
97. Komaki H, Maisawa S, Sugai K, Kobayashi Y, Hashimoto T. 1999. Tremor and seizures associated with chronic manganese intoxication. *Brain* 21:122-4.
98. Kondakis XG, Makris N, Leotsinidis M, Prinou M, Papapetropoulos T. 1989. Possible health effects of high manganese concentration in drinking water. *Arch Environ Health* 44:175-8.
99. Kuhnert PM, Kuhnert BR, Erhard P. 1981. Comparison of mercury levels in maternal blood, fetal cord blood, and placental tissues. *Am J Obstet Gynecol* 139:209-13.
100. Lauwerys RR, Bernard AM, Roels HA, Buchet JP. 1994. Cadmium: exposure markers as predictors of nephrotoxic effects. *Clin Chem* 40:1391-4.
101. Le XC, Lu X, Ma M, Cullen WR, Aposhian HV, Zheng B. 2000. Speciation of key arsenic metabolic intermediates in human urine. *Anal Chem* 72:5172-7.
102. Lemus R, Abdelghani AA, Akers TG, Horner WE. 1996. Health risks from exposure to metals in household dusts. *Rev Environ Health* 11:179-89.
103. Loranger S, Bibeau MC, Zayed J. 1994. [Manganese in drinking water and its contribution to human exposure]. *Rev Epidemiol Sante Publique* 42:315-21.
104. Loranger S, Zayed J. 1995. Environmental and occupational exposure to manganese: a multimedia assessment. *Int Arch Occup Environ Health* 67:101-10.
105. Loranger S, Zayed J. 1997. Environmental contamination and human exposure assessment to manganese in the StLawrence River ecozone (Quebec, Canada) using an environmental fate/exposure model: GEOTOX. SAR QSAR *Environ Res* 6:105-19.
106. Lyznicki JM, Karlan MS, Khan MK. 1999. Manganese in gasoline. Council on Scientific Affairs, American Medical Association. *J Occup Environ Med* 41:140-3.
107. MacIntosh DL, Spengler JD, Ozkaynak H, Tsai L, Ryan PB. 1996. Dietary exposures to selected metals and pesticides. *Environ Health Perspect* 104:202-9.
108. Malm O. 1998. Gold mining as a source of mercury exposure in the Brazilian Amazon. *Environ Res* 77:73-8.
109. Marlowe M, Stellern J, Errera J, Moon C. 1985. Main and interaction effects of metal pollutants on visual-motor performance. *Arch Environ Health* 40:221-5.
110. Marsh DO, Clarkson TW, Myers GJ, Davidson PW, Cox C, Cernichiari E, Tanner MA, Lednar W, Shamlaye C, Choisy O and others. 1995. The Seychelles study of fetal methylmercury exposure and child development: introduction. *Neurotoxicology* 16:583-96.
111. Marsh DO, Myers GJ, Clarkson TW, Amin-Zaki L, Tikriti S, Majeed MA. 1980. Fetal methylmercury poisoning: clinical and toxicological data on 29 cases. *Ann Neurol* 7:348-53.
112. Marsh DO, Turner MD, Smith JC, Allen P, Richdale N. 1995. Fetal methylmercury study in a Peruvian fish-eating population. *Neurotoxicology* 16:717-26.

113. Mena I, Horiuchi K, Burke K, Cotzias GC. 1969. Chronic manganese poisoning. Individual susceptibility and absorption of iron. *Neurology* 19:1000-6.
114. Meplan C, Verhaegh G, Richard MJ, Hainaut P. 1999. Metal ions as regulators of the conformation and function of the tumour suppressor protein p53: implications for carcinogenesis. *Proc Nutr Soc* 58:565-71.
115. Mergler D, Baldwin M. 1997. Early manifestations of manganese neurotoxicity in humans: an update. *Environ Res* 73:92-100.
116. Murata K, Weihe P, Araki S, Budtz-Jorgensen E, Grandjean P. 1999. Evoked potentials in Faroese children prenatally exposed to methylmercury. *Neurotoxicol Teratol* 21:471-2.
117. Murphy VA, Rosenberg JM, Smith QR, Rapoport SI. 1991. Elevation of brain manganese in calcium-deficient rats. *Neurotoxicology* 12:255-63.
118. Myers GJ, Davidson PW. 1998. Prenatal methylmercury exposure and children: neurologic, developmental, and behavioral research. *Environ Health Perspect* 106 Suppl 3:841-7.
119. Myers GJ, Davidson PW, Palumbo D, Shamlaye C, Cox C, Cernichiari E, Clarkson TW. 2000. Secondary analysis from the Seychelles Child Development Study: the child behavior checklist. *Environ Res* 84:12-9.
120. Myers GJ, Davidson PW, Shamlaye CF. 1998. A review of methylmercury and child development. *Neurotoxicology* 19:313-28.
121. Myers GJ, Davidson PW, Shamlaye CF, Axtell CD, Cernichiari E, Choisy O, Choi A, Cox C, Clarkson TW. 1997. Effects of prenatal methylmercury exposure from a high fish diet on developmental milestones in the Seychelles Child Development Study. *Neurotoxicology* 18:819-29.
122. Myers GJ, Marsh DO, Davidson PW, Cox C, Shamlaye CF, Tanner M, Choi A, Cernichiari E, Choisy O, Clarkson TW. 1995. Main neurodevelopmental study of Seychellois children following in utero exposure to methylmercury from a maternal fish diet: outcome at six months. *Neurotoxicology* 16:653-64.
123. National Academy of Sciences. 1994. *Science and judgment in risk assessment*. Washington, D.C.: National Academy Press.
124. National Academy of Sciences. 1999. *Arsenic in drinking water*. Washington, D.C.: National Academy Press.
125. National Academy of Sciences. 2000. *Toxicological effects of methylmercury*. Washington, D.C.: National Academy Press.
126. National Academy of Sciences. 2001. *Arsenic in drinking water. 2001 update*. Washington, DC: National Academy Press.
127. Newland MC. 1999. Animal models of manganese's neurotoxicity. *Neurotoxicology* 20:415-32.
128. Nordberg GF, Jin T, Nordberg M. 1994. Subcellular targets of cadmium nephrotoxicity: cadmium binding to renal membrane proteins in animals with or without protective metallothionein synthesis. *Environ Health Perspect* 102 Suppl 3:191-4.
129. Nordberg M, Nordberg GF. 2000. Toxicological aspects of metallothionein. *Cell Mol Biol (Noisy-Le-Grand)* 46:451-63.
130. Oo YK, Kobayashi E, Nogawa K, Okubo Y, Suwazono Y, Kido T, Nakagawa H. 2000. Renal effects of cadmium intake of a Japanese general population in two areas unpolluted by cadmium. *Arch Environ Health* 55:98-103.
131. Osius N, Karmaus W, Kruse H, Witten J. 1999. Exposure to polychlorinated biphenyls and levels of thyroid hormones in children. *Environ Health Perspect* 107:843-9.

132. Oskarsson A, Schultz A, Skerfving S, Hallen IP, Ohlin B, Lagerkvist BJ. 1996. Total and inorganic mercury in breast milk in relation to fish consumption and amalgam in lactating women. *Arch Environ Health* 51:234-41.
133. Osman K, Akesson A, Berglund M, Bremme K, Schutz A, Ask K, Vahter M. 2000. Toxic and essential elements in placentas of Swedish women. *Clin Biochem* 33:131-8.
134. Palumbo DR, Cox C, Davidson PW, Myers GJ, Choi A, Shamlaye C, Sloane-Reeves J, Cernichiari E, Clarkson TW. 2000. Association between prenatal exposure to methylmercury and cognitive functioning in Seychellois children: a reanalysis of the McCarthy Scales of Children's Ability from the main cohort study. *Environ Res* 84:81-8.
135. Park MJ, Currier M. 1991. Arsenic exposures in Mississippi: a review of cases. *South Med J* 84:461-4.
136. Paschal DC, Burt V, Caudill SP, Gunter EW, Pirkle JL, Sampson EJ, Miller DT, Jackson RJ. 2000. Exposure of the U.S. population aged 6 years and older to cadmium: 1988- 1994. *Arch Environ Contam Toxicol* 38:377-83.
137. Pellizzari ED, Perritt RL, Clayton CA. 1999. National human exposure assessment survey (NHEXAS): exploratory survey of exposure among population subgroups in EPA Region V. *J Expo Anal Environ Epidemiol* 9:49-55.
138. Peraza MA, Ayala-Fierro F, Barber DS, Casarez E, Rael LT. 1998. Effects of micronutrients on metal toxicity. *Environ Health Perspect* 106 Suppl 1:203-16.
139. Perl DP, Good PF. 1991. Aluminum, Alzheimer's disease, and the olfactory system. *Ann N Y Acad Sci* 640:8-13.
140. Petrick JS, Ayala-Fierro F, Cullen WR, Carter DE, Vasken Aposhian H. 2000. Monomethylarsonous acid (MMA(III)) is more toxic than arsenite in Chang human hepatocytes. *Toxicol Appl Pharmacol* 163:203-7.
141. Rasmussen PE, Subramanian KS, Jessiman BJ. 2001. A multi-element profile of housedust in relation to exterior dust and soils in the city of Ottawa, Canada. *Sci Total Environ* 267:125-40.
142. Rice DC, Hayward S. 1999. Comparison of visual function at adulthood and during aging in monkeys exposed to lead or methylmercury. *Neurotoxicology* 20:767-84.
143. Richardson GM. 1995. Assessment of mercury exposure and risks from dental amalgam. Ottawa: Health Canada.
144. Rikans LE, Yamano T. 2000. Mechanisms of cadmium-mediated acute hepatotoxicity. *J Biochem Mol Toxicol* 14:110-7.
145. Riley DM, Newby CA, Leal-Almeraz TO, Thomas VM. 2001. Assessing elemental mercury vapor exposure from cultural and religious practices. *Environ Health Perspect* 109:779-84.
146. Ritz B, Heinrich J, Wjst M, Wichmann E, Krause C. 1998. Effect of cadmium body burden on immune response of school children. *Arch Environ Health* 53:272-80.
147. Sandborgh-Englund G, Elinder CG, Langworth S, Schutz A, Ekstrand J. 1998. Mercury in biological fluids after amalgam removal. *J Dent Res* 77:615-24.
148. Santos-Burgoa C, Downs TJ. 2000. Selecting high-priority hazardous chemicals for tri-national control: a maximum-utility method applied to Mexico. *Int J Occup Environ Health* 6:220-37.
149. Seifert B, Becker K, Helm D, Krause C, Schulz C, Seiwert M. 2000. The German environmental survey 1990/1992 (GerES II): reference concentrations of selected environmental pollutants in blood, urine, hair, house dust, drinking water and indoor air. *J Expo Anal Environ Epidemiol* 10:552-65.
150. Shimbo S, Zhang ZW, Moon CS, Watanabe T, Nakatsuka H, Matsuda-Inoguchi N, Higashikawa K, Ikeda M. 2000. Correlation between urine and blood concentrations, and dietary intake of cadmium and lead among women in the general population of Japan. *Int Arch Occup Environ Health* 73:163-70.
151. Simpkins CO. 2000. Metallothionein in human disease. *Cell Mol Biol (Noisy-Le-Grand)* 46:465-88.

152. Skerfving S. 1988. Mercury in women exposed to methylmercury through fish consumption, and in their newborn babies and breast milk. *Bull Environ Contam Toxicol* 41:475-82.
153. Slemr F, Langer E. 1992. Increase in global atmospheric concentrations of mercury inferred from measurements over the Atlantic Ocean. *Nature* 355:434-7.
154. Smith AH, Arroyo AP, Mazumder DN, Kosnett MJ, Hernandez AL, Beeris M, Smith MM, Moore LE. 2000a. Arsenic-induced skin lesions among Atacameno people in Northern Chile despite good nutrition and centuries of exposure. *Environ Health Perspect* 108:617-20.
155. Smith AH, Lingas EO, Rahman M. 2000b. Contamination of drinking-water by arsenic in Bangladesh: a public health emergency. *Bull World Health Organ* 78:1093-103.
156. Snyder RD. 1971. Congenital mercury poisoning. *N Engl J Med* 284:1014-6.
157. Snyder RD, Seelinger DF. 1976. Methylmercury poisoning, Clinical follow-up and sensory nerve conduction studies. *J Neurol Neurosurg Psychiatry* 39:701-4.
158. Stern AH. 1993. Re-evaluation of the reference dose for methylmercury and assessment of current exposure levels. *Risk Anal* 13:355-64.
159. Swain EB, Engstrom DR, Bingham ME, Henning TA, Brezonik PL. 1992. Increasing rates of atmospheric mercury deposition in midcontinental North America. *Science* 257:784-7.
160. Swartz WJ. 1984. Effects of 1,1-bis(p-chlorophenyl)-2,2,2-trichloroethane (DDT) on gonadal development in the chick embryo: a histological and histochemical study. *Environ Res* 35:333-45.
161. Thatcher RW, Lester ML, McAlaster R, Horst R. 1982. Effects of low levels of cadmium and lead on cognitive functioning in children. *Arch Environ Health* 37:159-66.
162. Thomas DJ, Styblo M, Lin S. 2001. The cellular metabolism and systemic toxicity of arsenic. *Toxicol Appl Pharmacol* 176:127-44.
163. Trepka MJ, Heinrich J, Krause C, Schulz C, Wjst M, Popescu M, Wichmann HE. 1997. Factors affecting internal mercury burdens among eastern German children. *Arch Environ Health* 52:134-8.
164. Tsuchiya K. 1992. The discovery of the causal agent of Minamata disease. *Am J Ind Med* 21:275-80.
165. U.S. Environmental Protection Agency. 1994. Cadmium [Web Page]. Located at: <http://www.epa.gov/iris/subst/0141.htm>.
166. U.S. Environmental Protection Agency. 2000. 40 CFR Parts 141 and 142. National drinking water regulations; arsenic and clarifications to compliance and new source contaminants monitoring; proposed rule. *Federal Register* 65:38888-983.
167. U.S. Environmental Protection Agency. 2001. Hazard identification and toxicology endpoint selection for inorganic arsenic and inorganic chromium. FIFRA Scientific Advisory Panel background document [Web Page]. Located at: [http://www.epa.gov/scipoly/sap/2001/october/hazard\\_final\\_document.pdf](http://www.epa.gov/scipoly/sap/2001/october/hazard_final_document.pdf).
168. Vahter M, Concha G. 2001. Role of metabolism in arsenic toxicity. *Pharmacol Toxicol* 89:1-5.
169. Wallace L, Slonecker T. 1997. Ambient air concentrations of fine (PM<sub>2.5</sub>) manganese in U.S. national parks and in California and Canadian cities: the possible impact of adding MMT to unleaded gasoline. *J Air Waste Manag Assoc* 47:642-52.
170. Warkany J, Hubbard DM. 1951. Adverse mercurial reactions in the form of acrodynia and related conditions. *Am J Dis Child* 81:335-73.

171. Watanabe C, Satoh H. 1996. Evolution of our understanding of methylmercury as a health threat. *Environ Health Perspect* 104 Suppl 2:367-79.
172. Watanabe T, Shimbo S, Moon CS, Zhang ZW, Ikeda M. 1996. Cadmium contents in rice samples from various areas in the world. *Sci Total Environ* 184:191-6.
173. Watanabe T, Zhang ZW, Moon CS, Shimbo S, Nakatsuka H, Matsuda-Inoguchi N, Higashikawa K, Ikeda M. 2000. Cadmium exposure of women in general populations in Japan during 1991-1997 compared with 1977-1981. *Int Arch Occup Environ Health* 73:26-34.
174. Wheatley B, Paradis S. 1996. Balancing human exposure, risk and reality: questions raised by the Canadian aboriginal methylmercury program. *Neurotoxicology* 17:241-9.
175. Wheatley B, Paradis S. 1998. Northern exposure: further analysis of the results of the Canadian aboriginal methylmercury program. *Int J Circumpolar Health* 57 Suppl 1:586-90.
176. World Health Organization. 1990a. Environmental health criteria 101. Methylmercury [Web Page]. Located at: <http://www.inchem.org/documents/ehc/ehc/ehc101.htm>.
177. World Health Organization. 1990b. Evaluation of certain food additives and the contaminants mercury, lead and cadmium. Sixteenth report of the Joint FAO/WHO Committee of Food Additives. WHO Technical Report Series no 505. Geneva, Switzerland.
178. Wulff M, Hogberg U, Sandstrom A. 1996. Cancer incidence for children born in a smelting community. *Acta Oncol* 35:179-83.
179. Yamanaka K, Okada S. 1994. Induction of lung-specific DNA damage by metabolically methylated arsenics via the production of free radicals. *Environ Health Perspect* 102 Suppl 3:37-40.
180. Zayed J, Vyskocil A, Kennedy G. 1999. Environmental contamination and human exposure to manganese-- contribution of methylcyclopentadienyl manganese tricarbonyl in unleaded gasoline. *Int Arch Occup Environ Health* 72:7-13.
181. Zhang G, Liu D, He P. 1995. Effects of manganese on learning abilities in school children. *Chung Hua Yu Fang I Hsueh Tsa Chih* 29:156-8.
182. Zheng W, Ren S, Graziano JH. 1998. Manganese inhibits mitochondrial aconitase: a mechanism of manganese neurotoxicity. *Brain Res* 799:334-42.
183. Zierler S, Theodore M, Cohen A, Rothman KJ. 1988. Chemical quality of maternal drinking water and congenital heart disease. *Int J Epidemiol* 17:589-94.