Excerpt from

Integrated Science Assessment for Ozone and Related Photochemical Toxicants, Third Draft

Environmental Protection Agency, 2012

Reference Section of Chapter 6:
Integrated Health Effects of Short-Term Ozone Exposure

Excerpted by Michael Klein
Adamkiewicz, G; Ebelt, S; Syring, M; Slater, J; Speizer, FE; Schwartz, J; Suh, H; Gold, DR. (2004). Association between air pollution exposure and exhaled nitric oxide in an elderly population. Thorax 59: 204-209. http://dx.doi.org/10.1136/thorax.2003.006445


Adams, WC. (2003b). Relation of pulmonary responses induced by 66-h exposures to 0.08 ppm ozone and 2-h exposures to 0.30 ppm ozone via chamber and face-mask inhalation. Inhal Toxicol 15: 745-759.

Adams, WC. (2006a). Comparison of chamber 6.6-h exposures to 0.04-0.08 ppm ozone via square-wave and triangular profiles on pulmonary responses. Inhal Toxicol 18: 127-136. http://dx.doi.org/10.1080/08958370500306107

Adams, WC. (2006b). Human pulmonary responses with 30-minute time intervals of exercise and rest when exposed for 8 hours to 0.12 ppm ozone via square-wave and acute triangular profiles. Inhal Toxicol 18: 413-422. http://dx.doi.org/10.1080/08958370600563599


Alexis, N; Urch, B; Tarlo, S; Corey, P; Pengelly, D; O'Byrne, P; Silverman, F. (2000). Cyclooxygenase metabolites play a different role in ozone-induced pulmonary function decline in asthmatics compared to normals. Inhal Toxicol 12: 1205-1224.

Alexis, NE; Lay, JC; Hazucha, M; Harris, B; Hernandez, ML; Bromberg, PA; Kehrl, H; Diaz-Sanchez, D; Kim, C; Devlin, RB; Peden, DB. (2010). Low-level ozone exposure induces airways inflammation and modifies cell surface phenotypes in healthy humans. Inhal Toxicol 22: 593-600. http://dx.doi.org/10.3109/08958371003596587


Aranyi, C; Vana, SC; Thomas, PT; Bradof, JN; Fenters, JD; Graham, JA; Miller, FJ. (1983). Effects of subchronic exposure to a mixture of O₃, SO₂, and (NH₄)₂SO₄ on host defenses of mice. J Toxicol Environ Health 12: 55-71. http://dx.doi.org/10.1080/15287398309530407
Avissar, NE; Reed, CK; Cox, C; Frampton, MW; Finkelstein, JN. (2000). Ozone, but not nitrogen dioxide, exposure decreases glutathione peroxidases in epithelial lining fluid of human lung. Am J Respir Crit Care Med 162: 1342-1347.
Baccini, M; Biggeri, A; Accetta, G; Kosatsky, T; Katsouyanni, K; Analitis, A; Anderson, HR; Bisanti, L; D'Ippoliti, D; Danova, J; Forsberg, B; Medina, S; Paldy, A; Rabezenko, D; Schindler, C; Michelozzi, P. (2008). Heat effects on mortality in 15 European cities. Epidemiology 19: 711-719. http://dx.doi.org/10.1097/EDE.0b013e318176bfcd

Baja, ES; Schwartz, JD; Wellenius, GA; Coull, BA; Zanobetti, A; Vokonas, PS; Suh, HH. (2010). Traffic-related air pollution and QT interval: Modification by diabetes, obesity, and oxidative stress gene polymorphisms in the Normative Aging Study. Environ Health Perspect 118: 840-846. http://dx.doi.org/10.1289/ehp.0901396


Ballester, F; Rodriguez, P; Iniguez, C; Saez, M; Daponte, A; Galan, I; Taracido, M; Arribas, F; Bellido, J; Cirarda, FB; Canada, A; Guillen, JJ; Guillen-Grima, F; Lopez, E; Perez-Hoyos, S; Lertxundi, A; Toro, S. (2006). Air pollution and cardiovascular admissions association in Spain: Results within the EMECAS project. J Epidemiol Community Health 60: 328-336.

Ballester, F; Saez, M; Daponte, A; Ordonez, JM; Taracido, M; Cambra, K; Arribas, F; Bellido, JB; Guillen, JJ; Aguinaga, I; Canada, A; Lopez, E; Iniguez, C; Rodriguez, P; Perez-Hoyos, S; Barcelo, MA; Ocana, R; Aranguez, E. (2005). [The EMECAS Project: Spanish multicentre study on short-term health effects of air pollution]. Rev Esp Salud Publica 79: 229-242.


Balmes, JR; Chen, LL; Scannell, C; Tager, I; Christian, D; Hearne, PQ; Kelly, T; Aris, RM. (1996). Ozone-induced decrements in FEV1 and FVC do not correlate with measures of inflammation. Am J Respir Crit Care Med 153: 904-909.


Barnett, AG; Williams, GM; Schwartz, J; Best, TL; Neller, AH; Petroeschevsky, AL; Simpson, RW. (2006). The effects of air pollution on hospitalizations for cardiovascular disease in elderly people in Australian and New Zealand cities. Environ Health Perspect 114: 1018-1023. http://dx.doi.org/10.1289/ehp.0407131

Barraza-Villarreal, A; Sunyer, J; Hernandez-Cadena, L; Escamilla-Nunez, MC; Sienra-Monge, JJ; Ramirez-Aguilar, M; Cortez-Lugo, M; Holguin, F; Diaz-Sanchez, D; Olin, AC; Romieu, I. (2008). Air pollution, airway inflammation, and lung function in a cohort study of Mexico City schoolchildren. Environ Health Perspect 116: 832-839. http://dx.doi.org/10.1289/ehp.10926

Basha, MA; Gross, KB; Gwizdala, CJ; Haidar, AH; Popovich, J Jr. (1994). Bronchoalveolar lavage neutrophilia in asthmatic and healthy volunteers after controlled exposure to ozone and filtered purified air. Chest 106: 1576-1577.


Berhane, K; Zhang, Y; Linn, WS; Rappaport, FB; Bastain, TM; Salam, MT; Islam, T; Lurmann, F; Gilliland, FD. (2011). The effect of ambient air pollution on exhaled nitric oxide in the Children's Health Study. Eur Respir J 37: 1029-1036.


Brown, JS; Bateson, TF; McDonnell, WF. (2008). Effects of exposure to 0.06 ppm ozone on FEV1 in humans: A secondary analysis of existing data. Environ Health Perspect 116: 1023-1026.


http://dx.doi.org/10.3109/08923978909005397
http://dx.doi.org/10.2307/3315843

http://dx.doi.org/10.1016/j.envres.2009.03.004


http://dx.doi.org/10.1016/j.envres.2011.01.003

http://dx.doi.org/10.1097/01.jom.0000184878.11956.4b

http://dx.doi.org/10.3200/AEOH.61.1.5-10

http://dx.doi.org/10.1207/s15327914nc5502_11


http://dx.doi.org/10.1378/chest.128.5.3159


http://dx.doi.org/10.1289/ehp.7636


http://dx.doi.org/10.1289/ehp.10294


http://dx.doi.org/10.1080/08958370050164626

http://dx.doi.org/10.1289/ehp.99107921

Chen, XQ; Yang, J; Hu, SP; Nie, HX; Mao, GY; Chen, HB. (2006b). Increased expression of CD86 and reduced production of IL-12 and IL-10 by monocyte-derived dendritic cells from allergic asthmatics and their effects on Th1- and Th2-type cytokine balance. Respiratory 73: 34-40.  
http://dx.doi.org/10.1159/000087457


Christian, DL; Chen, LL; Scannell, CH; Ferrando, RE; Welch, BS; Balnes, JR. (1998). Ozone-induced inflammation is attenuated with multiday exposure. Am J Respir Crit Care Med 158: 532-537.


Damra, G; Jester William, F; Jiang, M; Zhao, H; Fogle Homer, W; Mittelman, M; Haefke, A; Murphy, E; Parikh, J; Panettieri, R; N. (2010). Inhibition of myristoylated alanine-rich C kinase substrate (MARCKS) protein inhibits ozone-induced airway neutrophilia and inflammation. Exp Lung Res 36: 75-84. http://dx.doi.org/10.3109/01902140903131200

Darrow, LA; Klein, M; Sarnat, JA; Mulholland, JA; Strickland, MJ; Sarnat, SE; Russell, AG; Tolbert, PE. (2011a). The use of alternative pollutant metrics in time-series studies of ambient air pollution and respiratory emergency department visits. J Expo Sci Environ Epidemiol 21: 10-19. http://dx.doi.org/10.1038/jes.2009.49

Delfino, RJ; Gillen, DL; Tjoa, T; Staimer, N; Polidori, A; Arhami, M; Sioutas, C; Longhurst, J. (2011). Electrocardiographic ST-segment depression and exposure to traffic-related aerosols in elderly subjects with coronary artery disease. Environ Health Perspect 119: 196-202. http://dx.doi.org/10.1289/ehp.1002372

Delfino, RJ; Gone, H; Linn, WS; Pellizzari, ED; Hu, Y. (2003). Asthma symptoms in Hispanic children and daily ambient exposures to toxic and criteria air pollutants. Environ Health Perspect 111: 647-656. http://dx.doi.org/10.1289/ehp.5992

Delfino, RJ; Quintana, PJ; Floro, J; Gastanaga, VM; Samimi, BS; Kleinman, MT; Liu, LJS; Bufalino, C; Wu, CF; McLaren, CE. (2004). Association of FEV1 in asthmatic children with personal and microenvironmental exposure to airborne particulate matter. Environ Health Perspect 112: 932-941.

Delfino, RJ; Staimer, N; Tjoa, T; Arhami, M; Polidori, A; Green, GE; Shafer, MM; Schauer, JJ; Sioutas, C. (2010a). Associations of primary and secondary organic aerosols with airway and systemic inflammation in an elderly panel cohort. Epidemiology 21: 892-902. http://dx.doi.org/10.1097/EDE.0b013e3181f20e6c

Delfino, RJ; Tjoa, T; Gillen, DL; Staimer, N; Polidori, A; Arhami, M; Jamner, L; Sioutas, C; Longhurst, J. (2010b). Traffic-related air pollution and blood pressure in elderly subjects with coronary artery disease. Epidemiology 21: 396-404. http://dx.doi.org/10.1097/EDE.0b013e3181d5e19b

Delfino, RJ; Zeiger, RS; Seltzer, JS; Street, DH; Matteucci, RM; Anderson, PR; Koutrakis, P. (1997). The effect of outdoor fungal spore concentrations on daily asthma severity. Environ Health Perspect 105: 622-635.


Dennekamp, M; Akram, M; Abramson, MJ; Tonkin, A; Sim, MR; Fridman, M; Erbas, B. (2010). Outdoor air pollution as a trigger for out-of-hospital cardiac arrests. Epidemiology 21: 494-500. http://dx.doi.org/10.1097/EDE.0b013e3181e093dh


Devlin, RB; Folinsbee, LJ; Biscardi, F; Hatch, G; Becker, S; Madden, MC; Robbins, M; Koren, HS. (1997). Inflammation and cell damage induced by repeated exposure of humans to ozone. Inhal Toxicol 9: 211-235.

Devlin, RB; Mcdonnel, WF; Becker, S; Madden, MC; Mcgee, MP; Perez, R; Hatch, G; House, DE; Koren, HS. (1996). Time-dependent changes of inflammatory mediators in the lungs of humans exposed to 0.4 ppm ozone for 2 hr: A comparison of mediators found in bronchoalveolar lavage fluid 1 and 18 hr after exposure. Toxicol Appl Pharmacol 138: 176-185. http://dx.doi.org/10.1006.taap.1996.0111

Devlin, RB; Mcdonnel, WF; Mann, R; Becker, S; House, DE; Schreinemachers, D; Koren, HS. (1991). Exposure of humans to ambient levels of ozone for 6.6 hours causes cellular and biochemical changes in the lung. Am J Respir Cell Mol Biol 4: 72-81.


Dockery, DW; Luttmann-Gibson, H; Rich, DQ; Link, MS; Mittleman, MA; Gold, DR; Koutnakis, P; Schwartz, JD; Verrier, RL. (2005). Association of air pollution with increased incidence of ventricular tachyarrhythmias recorded by implanted cardioverter defibrillators. Environ Health Perspect 113: 670-674.


Dryden, DM; Spooner, CH; Stickland, MK; Vandermeer, B; Tjosvold, L; Bialy, L; Wong, K; Rowe, BH. (2010). Exercise-induced bronchoconstriction and asthma. (AHRQ Publication No. 10-E001). Rockville, MD: Agency for Healthcare Research and Quality.


Dungworth, DL; Castelman, WL; Chow, CK; Mellick, PW; Mustafa, MG; Tarkington, B; Tyler, WS. (1975). Effect of ambient levels of ozone on monkeys. Fed Proc 34: 1670-1674.


Fakhri, AA; Ilic, LM; Wellenius, GA; Urch, B; Silverman, F; Gold, DR; Mittleman, MA. (2009). Autonomic effects of controlled particulate exposure in young healthy adults: Effect modification by ozone. Environ Health Perspect 117: 1287-1292. [http://dx.doi.org/10.1289/ehp.0900541]

Farraj, AK; Boykin, E; Ledbetter, A; Andrews, D; Gavett, SH. (2010). Increased lung resistance after diesel particulate and ozone co-exposure not associated with enhanced lung inflammation in allergic mice. Inhal Toxicol 22: 33-41. [http://dx.doi.org/10.3109/08958370902862434]


Feo Brito, F; Mur Gimeno, P; Martinez, C; Tobias, A; Suarez, L; Guerra, F; Borja, JM; Alonso, AM. (2007). Air pollution and seasonal asthma during the pollen season: A cohort study in Puertollano and Ciudad Real (Spain). Allergy 62: 1152-1157. [http://dx.doi.org/10.1111/j.1398-9995.2007.01438.x]


Fox, SD; Adams, WC; Brookes, KA; Lasley, BL. (1993). Enhanced response to ozone exposure during the follicular phase of the menstrual cycle. Environ Health Perspect 101: 242-249.


Frampton, MW; Morrow, PE; Torres, A; Cox, C; Votter, KZ; Utell, MJ; Gibb, FR; Speers, DM. (1997a). Ozone responsiveness in smokers and nonsmokers. Am J Respir Crit Care Med 155: 116-121.


Garantziotis, S; Li, Z; Potts, EN; Lindsey, JY; Stober, VP; Polosukhin, VV; Blackwell, TS; Schwartz, DA; Foster, WM; Hollingsworth, JW. (2010). TLR4 is necessary for hyaluronan-mediated airway hyperresponsiveness after ozone inhalation. Am J Respir Crit Care Med 181: 666-675. http://dx.doi.org/10.1164/rccm.200903-0381OC


Gilliland, FD; Berhane, K; Rappaport, EB; Thomas, DC; Avol, E; Gauderman, WJ; London, SJ; Margolis, HG; McConnell, R; Islam, KT; Peters, JM. (2001). The effects of ambient air pollution on school absenteeism due to respiratory illnesses. Epidemiology 12: 43-54.


Girardot, SP; Ryan, PB; Smith, SM; Davis, WT; Hamilton, CB; Obenour, RA; Renfro, JR; Tromatore, KA; Reed, GD. (2006). Ozone and PM2.5 exposure and acute pulmonary health effects: A study of hikers in the Great Smoky Mountains National Park. Environ Health Perspect 113: 612-617. http://dx.doi.org/10.1289/ehp.8637

Gold, DR; Damokosh, AI; III, PC; Dockery, DW; McDonnell, WF; Serrano, P; Retama, A; Castillejos, M. (1999). Particulate and ozone pollutant effects on the respiratory function of children in southwest Mexico City. Epidemiology 10: 8-16.

Goldberg, MS; Giannetti, N; Burnett, RT; Mayo, NE; Valois, MF; Brophy, JM. (2008). A panel study in congestive heart failure to estimate the short-term effects from personal factors and environmental conditions on oxygen saturation and pulse rate. Occup Environ Med 65: 659-666. http://dx.doi.org/10.1136/oem.2007.034934

Gong, H, Jr; Bradley, PW; Simmons, MS; Tashkin, DP. (1986). Impaired exercise performance and pulmonary function in elite cyclists during low-level ozone exposure in a hot environment. Am J Respir Crit Care Med 134: 726-733.


Gryparis, A; Forsberg, B; Katsouyanni, K; Analitis, A; Touloumi, G; Schwartz, J; Samoli, E; Medina, S; Anderson, HR; Nicu, EM; Wichmann, HE; Kriz, B; Kosnik, M; Skorkovsky, J; Vonk, JM; Dormbodak, Z. (2004). Acute effects of ozone on mortality from the "Air pollution and health: A European approach" project. Am J Respir Crit Care Med 170: 1080-1087. http://dx.doi.org/10.1164/rccm.200403-333OC


Hackney, JD; Linn, WS; Buckley, RD; Hislop, HJ. (1976). Studies in adaptation to ambient oxidant air pollution: effects of ozone exposure in Los Angeles residents vs new arrivals. Environ Health Perspect 18: 141-146.

Hackney, JD; Linn, WS; Karuza, SK; Buckley, RD; Law, DC; Bates, DV; Hazucha, M; Pengelly, LD; Silverman, F. (1977a). Effects of ozone exposure in Canadians and southern Californians: evidence for adaptation? Arch Environ Occup Health 32: 110-116.


Harkema, JR; Plopper, CG; Hyde, DM; St George, JA; Wilson, DW; Dungworth, DL. (1987b). Response of the macaque nasal epithelium to ambient levels of ozone: A morphologic and morphometric study of the transitional and respiratory epithelium. Am J Pathol 128: 29-44.


Heidenfelder, BL; Reif, DM; Harkema, J. R.; Cohen Hubal, EA; Hadgens, EE; Bramble, LA; Wagner, JG; Morishita, M; Keeler, GJ; Edwards, SW; Gallagher, JE. (2009). Comparative microarray analysis and pulmonary changes in brown Norway rats exposed to ovalbumin and concentrated air particulates. Toxicol Sci 108: 207-221. http://dx.doi.org/10.1093/toxsci/kfp005


Hernandez, ML; Lay, JC; Harris, B; Esther, CR; Brickey, WJ; Bromberg, PA; Diaz-Sanchez, D; Devlin, RB; Kleeberger, SR; Alexis, NE; Peden, DB. (2010). Atopic asthmatic subjects but not atopic subjects without asthma have enhanced inflammatory response to ozone. J Allergy Clin Immunol 126: 537-544. http://dx.doi.org/10.1016/j.jaci.2010.06.043

Hicks, A; Goodnow, R Jr; Cavallo, G; Tannu, SA; Ventre, JD; Lavelle, D; Lora, JM; Satjawatcharaphong, J; Brovarney, M; Dabbagh, K; Tare, NS; Oh, H; Lamb, M; Sidduri, A; Dominique, R; Qiao, Q; Lou, JP; Gillespie, P; Fotouhi, N; Kowalczyk, A; Kuryliko, G; Hamid, R; Wright, MB; Pamidimukkala, A; Egan, T; Gubler, U; Hoffman, AF; Wei, X; Li, YL; O'Neil, J; Marciano, R; Pozzani, K; Molinaro, T; Santiago, J; Singer, L; Hargaden, M; Moore, D; Catala, AR; Chao, LC; Benson, J; March, T; Venkat, R; Mancoo, H; Ranzetti, LM. (2010a). Effects of LTB4 receptor antagonism on pulmonary inflammation in rodents and non-human primates. Prostaglandins Other Lipid Mediat 92: 33-43. http://dx.doi.org/10.1016/j.prostaglandins.2010.02.003

Hicks, A; Kourteva, G; Hilton, H; Li, H; Lin, T; Liao, W; Li, Y; Wei, X; March, T; Benson, J; Ranzetti, L. (2010b). Cellular and molecular characterization of ozone-induced pulmonary inflammation in the Cynomolgus monkey. Inflammation 33: 144-156. http://dx.doi.org/10.1007/s10753-009-9168-5


Hiltermann, JTN; Stolk, J; Hiemstra, PS; Fokkens, PHB; Rombout, PJA; Sont, JK; Sterk, PJ; Dijkman, JH. (1995). Effect of ozone exposure on maximal airway narrowing in non-asthmatic and asthmatic subjects. Clin Sci (Lond) 89: 619-624.


Hollingsworth, JW; Cook, DN; Brass, DM; Walker, JKL; Morgan, DL; Foster, WM; Schwartz, DA. (2004). The role of Toll-like receptor 4 in environmental airway injury in mice. Am J Respir Crit Care Med 170: 126-132. http://dx.doi.org/10.1164/rccm.200311-1499OC


Holz, O; Jorres, RA; Timm, P; Mucke, M; Richter, K; Koschyk, S; Magnussen, H. (1999). Ozone-induced airway inflammatory changes differ between individuals and are reproducible. Am J Respir Crit Care Med 159: 776-784.

Holz, O; Mucke, M; Paasch, K; Bohme, S; Timm, P; Richter, K; Magnussen, H; Jorres, RA. (2002). Repeated ozone exposures enhance bronchial allergen responses in subjects with rhinitis or asthma. Clin Exp Allergy 32: 681-689.


Horstman, DH; Folinsbee, LJ; Ives, PJ; Abdul-Salaam, S; McDonnell, WF. (1990). Ozone concentration and pulmonary response relationships for 6.6-hour exposures with five hours of moderate exercise to 0.08, 0.10, and 0.12 ppm. Am J Respir Crit Care Med 142: 1158-1163.


Jalaludin, BB; Chey, T; O'Toole, BI; Smith, WT; Capon, AG; Leeder, SR. (2000). Acute effects of low levels of ambient ozone on peak expiratory flow rate in a cohort of Australian children. Int J Epidemiol 29: 549-557. http://dx.doi.org/10.1093/ije/29.3.549


Jang, AS; Choi, IS; Yang, SY; Kim, YG; Lee, JH; Park, SW; Park, CS. (2005). Antioxidant responsiveness in BALB/c mice exposed to ozone. Respiration 72: 79-84. http://dx.doi.org/10.1159/000083405


Jones, SL; Kittelson, J; Cowan, JO; Flannery, EM; Hancox, RJ; McLachlan, CR; Taylor, DR. (2001). The predictive value of exhaled nitric oxide measurements in assessing changes in asthma control. Am J Respir Crit Care Med 164: 738-743.


Jorres, RA; Holz, O; Zachgo, W; Timm, P; Koschyk, S; Muller, B; Grimminger, F; Seeger, W; Kelly, FJ; Dunster, C; Frischer, T; Lubec, G; Wächsowski, M; Niendorf, A; Magnussen, H. (2000). The effect of repeated ozone exposures on inflammatory markers in bronchoalveolar lavage fluid and mucosal biopsies. Am J Respir Crit Care Med 161: 1855-1861.


Katsouyanni, K; Touloumi, G; Samoli, E; Gryparis, A; Le Tertre, A; Monopolis, Y; Rossi, G; Zmirou, D; Ballester, F; Boumghar, A; Anderson, HR; Wijtyniak, B; Paldy, A; Braunstein, R; Pekkanen, J; Schindler, C; Schwartz, J. (2001). Confounding and effect modification in the short-term effects of ambient particles on total mortality: Results from 29 European cities within the APHEA2 project. Epidemiology 12: 521-531.


Kehrl, HR; Peden, DB; Ball, BA; Folinisbee, LJ; Horstman, DH. (1999). Increased specific airway reactivity of persons with mild allergic asthma after 7.6 hours of exposure to 0.16 ppm ozone. J Allergy Clin Immunol 104: 1198-1204.


Khatri, SB; Holguin, FC; Ryan, PB; Mannino, D; Erzurum, SC; Teague, WG. (2009). Association of ambient ozone exposure with airway inflammation and allergy in adults with asthma. J Asthma 46: 777-785. http://dx.doi.org/10.1080/02770900902779284

Kim, CS; Alexis, NE; Rappold, AG; Kehrl, H; Hazucha, MJ; Lay, JC; Schmitt, MT; Case, M; Devlin, RB; Peden, DB; Diaz-Sanchez, D. (2011). Lung function and inflammatory responses in healthy young adults exposed to 0.06 ppm ozone for 6.6 hours. Am J Respir Crit Care Med 183: 1215-1221. http://dx.doi.org/10.1164/rccm.201011-1813OC


Kodavanti, UP; Thomas, R; Ledbetter, AD; Schladweiler, MC; Shannahah, JH; Wallenborn, JG; Lund, AK; Campen, MJ; Butler, EO; Gottipolu, RR; Nyska, A; Richards, JE; Andrews, D; Jaskot, RH; McKee, J; Kohtha, SR; Patel, RB; Parianandi, NL. (2011). Vascular and cardiac impairments in rats Inhaling ozone and diesel exhaust particles. Environ Health Perspect 119: 312-318. http://dx.doi.org/10.1289/ehp.1002386

Korrick, SA; Neas, LM; Dockery, DW; Gold, DR; Allen, GA; Hill, LB; Kimball, KD; Rosner, BA; Speizer, FE. (1998). Effects of ozone and other pollutants on the pulmonary function of adult hikers. Environ Health Perspect 106: 93-99. http://dx.doi.org/10.1289/ehp.9810693

Kostikas, K; Papatheodorou, G; Ganas, K; Psathakis, K; Panagou, P; Loukides, S. (2002). pH in expired breath condensate of patients with inflammatory airway diseases. Am J Respir Crit Care Med 165: 1364-1370.


Kulle, TJ; Sauder, LR; Kerr, HD; Farrell, BP; Bermel, MS; Smith, DM. (1982). Duration of pulmonary function adaptation to ozone in humans. Am Ind Hyg Assoc J 43: 832-837.


Lanki, T; Pekkanen, J; Aalto, P; Eloisa, R; Berglund, N; D'Ippoliti, D; Kulmala, M; Nyberg, F; Peters, A; Picciotto, S; Salomaa, V; Sunyer, J; Tiittanen, P; Von Klot, S; Forastiere, F. (2006). Associations of traffic-related air pollutants with hospitalisation for first acute myocardial infarction: The HEAPSS study. Occup Environ Med 63: 844-851.

Larrieu, S; Jusot, JF; Blanchard, M; Prouvost, H; Declercq, C; Fabre, P; Pascal, I; Le Tertre, A; Wagner, V; Riviere, S; Chardon, B; Borelli, D; Cassadou, S; Eilstein, D; Lefranca, A. (2007). Short term effects of air pollution on hospitalizations for cardiovascular diseases in eight French cities: The PSAS program. Sci Total Environ 387: 105-112.


Lay, JC; Alexis, NE; Kleeberger, SR; Roube, RA; Harris, BD; Bromberg, PA; Hazucha, MJ; Devlin, RB; Peden, DB. (2007). Ozone enhances markers of innate immunity and antigen presentation on airway macrocytes in healthy individuals. J Allergy Clin Immunol 120: 719-722. http://dx.doi.org/10.1016/j.jaci.2007.05.005


Lee, IM; Tsai, SS; Ho, CK; Chiu, HF; Yang, CY. (2007). Air pollution and hospital admissions for congestive heart failure in a tropical city: Kaohsiung, Taiwan. Inhal Toxicol 19: 899-904. http://dx.doi.org/10.1080/08958370701479406


Lewis, TC; Robins, TG; Dvonch, JT; Keeler, GJ; Yip, FY; Mentz, GB; Lin, X; Parker, EA; Israel, BA; Gonzalez, I; Hill, Y. (2005). Air pollution-associated changes in lung function among asthmatic children in Detroit. Environ Health Perspect 113:1068-1075.

Liao, D; Duan, Y; Whitsel, EA; Zheng, ZJ; Heiss, G; Chinchilli, VM; Lin, HM. (2004a). Association of higher levels of ambient criteria pollutants with impaired cardiac autonomic control: a population-based study. Am J Epidemiol 159: 768-777.


Lim, Y; Phung, AD; Corbacho, AM; Aung, HH; Maioli, E; Reznick, AZ; Cross, CE; Davis, PA; Valacchi, G. (2006). Modulation of cutaneous wound healing by ozone: Differences between young and aged mice. Toxicol Lett 160:127-134. http://dx.doi.org/10.1016/j.toxlet.2005.06.013


Linn, WS; Avol, EL; Shamoo, DA; Peng, RC; Valencia, LM; Little, DE; Hackney, JD. (1986). A dose-response study of healthy, heavily exercising men exposed to ozone at concentrations near the ambient air quality standard. Toxicol Ind Health 2: 99-112.

Linn, WS; Avol, EL; Shamoo, DA; Spier, CE; Valencia, LM; Venet, TG; Fischer, DA; Hackney, JD. (1988). Repeated laboratory ozone exposures of volunteer Los Angeles residents: an apparent seasonal variation in response. Toxicol Ind Health 4: 505-520.


Lisabeth, LD; Escobar, JD; Dvonch, JT; Sanchez, BN; Majersik, JJ; Brown, DL; Smith, MA; Morgenstern, LB. (2008). Ambient air pollution and risk for ischemic stroke and transient ischemic attack. Ann Neurol 64:53-59. http://dx.doi.org/10.1002/ana.21403


Liu, L; Poon, R; Chen, L; Frescura, AM; Montuschi, P; Ciabattoni, G; Wheeler, A; Dales, R. (2009a). Acute effects of air pollution on pulmonary function, airway inflammation, and oxidative stress in asthmatic children. Environ Health Perspect 117: 668-674. http://dx.doi.org/10.1289/ehp11813

Mann, JK; Balmes, JR; Bruckner, TA; Mortimer, KM; Margolis, HG; Pratt, B; Hammond, SK; Lurmann, F; Tager, IB. (2010). Short-term effects of air pollution on wheeze in asthmatic children in Fresno, California. Environ Health Perspect 118: 1497-1502. http://dx.doi.org/10.1289/ehp.0901292

Mapp, CE; Fryer, AA; De Marzo, N; Pozzato, V; Padoan, M; Boschetto, P; Strange, RC; Hemmingsen, A; Spiteri, MA. (2002). Glutathione S-transferase GSTP1 is a susceptibility gene for occupational asthma induced by isocyanates. J Allergy Clin Immunol 109: 867-872. http://dx.doi.org/10.1067/mai.2002.123234


Mellick, PW; Dungworth, DL; Schwartz, LW; Tyler, WS. (1977). Short term morphologic effects of high ambient levels of ozone on lungs of rhesus monkeys. Lab Invest 36: 82-90.


Metzger, KB; Klein, M; Flanders, WD; Peel, JH; Mulholland, JA; Langberg, JH; Tolbert, PE. (2007). Ambient air pollution and cardiac arrhythmias in patients with implantable defibrillators. Epidemiology 18: 585-592. http://dx.doi.org/10.1097/EDE.0b013e318124f0Be

Metzger, KB; Tolbert, PE; Klein, M; Peel, JH; Flanders, WD; Todd, KH; Mulholland, JA; Ryan, PB; Frumkin, H. (2004). Ambient air pollution and cardiovascular emergency department visits. Epidemiology 15: 46-56.


Mokoena, ML; Harvey, BH; Oliver, DW; Brink, CB. (2010). Ozone modulates the effects of imipramine on immobility in the forced swim test, and nonspecific parameters of hippocampal oxidative stress in the rat. Metab Brain Dis 25: 125-133. http://dx.doi.org/10.1007/s11011-010-9189-7


Naeher, LP; Holford, TR; Beckett, WS; Belanger, K; Trice, EW; Bracken, MB; Leaderer, BP. (1999). Healthy women's PEF variations with ambient summer concentrations of PM10, PM2.5, SO42-, H+, and O3. Am J Respir Crit Care Med 160: 117-125.


Nickmilder, M; De Burbure, C; Sylviane, C; Xavier, D; Alfred, B; Alain, D. (2007). Increase of exhaled nitric oxide in children exposed to low levels of ambient ozone. J Toxicol Environ Health A 70: 270-274.

Nightingale, JA; Rogers, DF; Chung, KF; Barnes, PJ. (2000). No effect of inhaled budesonide on the response to inhaled ozone in normal subjects. Am J Respir Crit Care Med 161: 479-486.


Orazzo, F; Nespoli, L; Ito, K; Tassinari, D; Giardina, D; Funis, M; Cecchi, A; Trapani, C; Forgesci, G; Vignini, M; Nosetti, L; Pigna, S; Zanobetti, A. (2009). Air pollution, aeroallergens, and emergency room visits for acute respiratory diseases and gastroenteric disorders among young children in six Italian cities. Environ Health Perspect 117: 1780-1785. http://dx.doi.org/10.1289/ehp.0900599


Park, SK; O'Neill, MS; Vokonas, PS; Sparrow, D; Schwartz, J. (2005b). Effects of air pollution on heart rate variability: The VA Normative Aging Study. Environ Health Perspect 113: 304-309.

Park, SK; O'Neill, MS; Vokonas, PS; Sparrow, D; Wright, RO; Coull, B; Nie, H; Hu, H; Schwartz, J. (2008). Air pollution and heart rate variability: Effect modification by chronic lead exposure. Epidemiology 19: 111-120. http://dx.doi.org/10.1097/EDE.0b013e31815c408a


Peacock, JL; Anderson, HR; Bremner, SA; Marston, L; Seemungal, TA; Strachan, DP; Wedzicha, JA. (2011). Outdoor air pollution and respiratory health in patients with COPD. Thorax 66: 591-596. http://dx.doi.org/10.1136/thx.2010.155358


Peel, JL; Metzger, KB; Klein, M; Flanders, WD; Mulholland, JA; Tolbert, PE. (2007). Ambient air pollution and cardiovascular emergency department visits in potentially sensitive groups. Am J Epidemiol 165: 625-633.
Pellegrino, R; Viegi, G; Brusasco, V; Crapo, RO; Burgos, F; Casaburi, R; Coates, A; van der Grinten, CP; Gustafsson, P; Hankinson, J; Jensen, R; Johnson, DC; MacIntyre, N; McKay, R; Miller, MR; Navajas, D; Pedersen, OF; Wanger, J. (2005). Interpretative strategies for lung function tests. Eur Respir J 26: 948-968. http://dx.doi.org/10.1183/09031936.05.0035205


Peters, A; Dockery, DW; Muller, JE; Mittleman, MA. (2001). Increased particulate air pollution and the triggering of myocardial infarction. Circulation 103: 2810-2815. http://dx.doi.org/10.1161/01.CIR.103.23.2810


Puller, MK; Taube, C; Gelfand, E; Murphy, RC. (2005). Ozone exposure in vivo and formation of biologically active oxysterols in the lung. J Pharmacol Exp Ther 312: 256-264.

Qian, Z; Lin, HM; Chinchilli, VM; Lehman, EB; Duan, Y; Craig, TJ; Wilson, WE; Liao, D; Lazarus, SC; Bascom, R. (2009). Interaction of ambient air pollution with asthma medication on exhaled nitric oxide among asthmatics. Arch Environ Occup Health 64: 168-176. http://dx.doi.org/10.1080/19338240903240616

Que, LG; Stiles, JV; Sundy, JS; Foster, WM. (2011). Pulmonary function, bronchial reactivity, and epithelial permeability are response phenotypes to ozone and develop differentially in healthy humans. J Appl Physiol 111: 679-687. http://dx.doi.org/10.1152/japplphysiol.00337.2011


Rich, DQ; Kim, MH; Turner, JR; Mittleman, MA; Schwartz, J; Catalano, PJ; Dockery, DW. (2006a). Association of ventricular arrhythmias detected by implantable cardioverter defibrillator and ambient air pollutants in the St Louis, Missouri metropolitan area. Occup Environ Med 63: 591-596.


Rich, DQ; Mittleman, MA; Link, MS; Schwartz, J; Luttmann-Gibson, H; Catalano, PJ; Speizer, FE; Gold, DR; Dockery, DW. (2006b). Increased risk of paroxysmal atrial fibrillation episodes associated with acute increases in ambient air pollution. Environ Health Perspect 114: 120-123. http://dx.doi.org/10.1289/ehp.8371


Romieu, I; Meneses, F; Ramirez, M; Ruiz, S; Padilla, RP; Sienna, JJ; Gerber, M; Grieving, L; Dekker, R; Wald, I; Brunekreef, B. (1998b). Antioxidant supplementation and respiratory functions among workers exposed to high levels of ozone. Am J Respir Crit Care Med 158: 226-232.


Romieu, I; Sienna-Monge, JJ; Ramirez-Aguilar, M; Tellez-Rojo, MM; Moreno-Macias, H; Reyes-Ruiz, NI; Del Rio-Navarro, BE; Ruiz-Navarro, MX; Hatch, G; Slade, R; Hernandez-Avila, M. (2002). Antioxidant supplementation and lung functions among children with asthma exposed to high levels of air pollutants. Am J Respir Crit Care Med 166: 703-709.


Ross, MA; Persky, VW; Scheff, PA; Chung, J; Curtis, I; Ramakrishnan, V; Wadden, RA; Hryhorczuk, DO. (2002). Effect of ozone and aeroallergens on the respiratory health of asthmatics. Arch Environ Occup Health 57: 568-578. http://dx.doi.org/10.1080/00039890209602090


Rudez, G; Janssen, NA; Kilinc, E; Leebeek, FW; Gerlofs-Nijland, ME; Spronk, HM; ten Cate, H; Cassee, FR; de Maat, MP. (2009). Effects of ambient air pollution on hemostasis and inflammation. Environ Health Perspect 117: 995-1001. http://dx.doi.org/10.1289/ehp.0800437


Ruidavets, JB; Cournot, M; Cassadou, S; Giroux, M; Meybeck, M; Ferrieres, J. (2005b). Ozone air pollution is associated with acute myocardial infarction. Circulation 111: 563-569.


Samet, JM; Zeger, SL; Dominici, F; Curriero, F; Courasaei, I; Dockery, DW; Schwartz, J; Zanobetti, A. (2000). The national morbidity, mortality, and air pollution study. Part II: Morbidity, mortality, and air pollution in the United States. Cambridge, MA: Health Effects Institute.


Sarrat, SE; Coull, BA; Schwartz, J; Gold, DR; Suh, HH. (2006a). Factors affecting the association between ambient concentrations and personal exposures to particles and gases. Environ Health Perspect 114: 649-654.

Sarrat, SE; Suh, HH; Coull, BA; Schwartz, J; Stone, PH; Gold, DR. (2006b). Ambient particulate air pollution and cardiac arrhythmia in a panel of older adults in Steubenville, Ohio. Occup Environ Med 63: 700-706.


Seannell, C; Chen, L; Aris, RM; Tager, I; Christian, D; Ferrando, R; Welch, B; Kelly, T; Balmes, JR. (1996). Greater ozone-induced inflammatory responses in subjects with asthma. Am J Respir Crit Care Med 154: 24-29.


Schelegle, ES; Morales, CA; Walby, WF; Marion, S; Allen, RP. (2009). 6.6-hour inhalation of ozone concentrations from 60 to 87 parts per billion in healthy humans. Am J Respir Crit Care Med 180: 265-272. http://dx.doi.org/10.1164/rcrm.200809-1484OC


Schwartz, J; Litonjua, A; Suh, H; Verrier, M; Zanobetti, A; Syring, M; Nearing, B; Verrier, R; Stone, P; Maccallum, G; Speizer, FE; Gold, DR. (2005). Traffic related pollution and heart rate variability in a panel of elderly subjects. Thorax 60: 455-461. http://dx.doi.org/10.1136/thx.2004.024836


Schwartz, LW; Dungworth, DL; Mustafa, MG; Tarkington, BK; Tyler, WS. (1985). Pulmonary responses of rats to ambient levels of ozone: effects of 7-day intermittent or continuous exposure. Lab Invest 54: 565-578.


Seal, E, Jr; McDonnell, WF; House, DE; Salaam, SA; Dewitt, PJ; Butler, SO; Green, J; Raggio, L. (1993). The pulmonary response of white and black adults to six concentrations of ozone. Am J Respir Crit Care Med 147: 804-810.


Sivagangabalan, G; Spears, D; Masse, S; Urch, B; Brook, RD; Silverman, F; Gold, DR; Lukic, KZ; Speck, M; Kusha, M; Farid, T; Poku, K; Shi, F; Floras, J; Nanthakumar, K. (2011). The effect of air pollution on spatial dispersion of myocardial repolarization in healthy human volunteers. J Am Coll Cardiol 57: 198-206. http://dx.doi.org/10.1016/j.jacc.2010.08.625


Son, JY; Bell, ML; Lee, JT. (2010). Individual exposure to air pollution and lung function in Korea: Spatial analysis using multiple exposure approaches. Environ Res 110: 739-749. http://dx.doi.org/10.1016/j.envres.2010.08.003

Soulaque, C; Perrin, D; Cottet-Emard, JM; Pequignot, J; Dalmaz, Y; Pequignot, JM. (2004). Central and peripheral changes in catecholamine biosynthesis and turnover in rats after a short period of ozone exposure. Neurochem Int 45: 979-986.


Stafoggia, M; Forastiere, F; Faustini, A; Biggeri, A; Bisanti, L; Cadum, E; Cernigliaro, A; Mallone, S; Pandolfi, P; Serinelli, M; Tessari, R; Vigotti, MA; Perucci, CA. (2010). Susceptibility factors to ozone-related mortality: A population-based case-crossover analysis. Am J Respir Crit Care Med 182: 376-384. http://dx.doi.org/10.1164/rcrm.200908-1269OC


Strickland, MJ; Darrow, LA; Klein, M; Flanders, WD; Sarnat, JA; Waller, LA; Sarnat, SE; Mulholland, JA; Tolbert, PE. (2010). Short-term associations between ambient air pollutants and pediatric asthma emergency department visits. Am J Respir Crit Care Med 182: 307-316. http://dx.doi.org/10.1164/rccm.200908-1201OC

Strickland, MJ; Darrow, LA; Mulholland, JA; Klein, M; Flanders, WD; Winquist, A; Tolbert, PE. (2011). Implications of different approaches for characterizing ambient air pollutant concentrations within the urban airshed for time-series studies and health benefits analyses. Environ Health Global Access Sci Source 10: 36. http://dx.doi.org/10.1186/1476-069X-10-36


Tamer, L; Calikoglu, M; Ates, NA; Yildirim, H; Ercan, B; Saritas, E; Unlu, A; Atik, U. (2004). Glutathione-S-transferase gene polymorphisms (GSTM1, GSTT1, GSTP1) as increased risk factors for asthma. Respiriology 9: 493-498.


Thaller, E; Petronella, SA; Hochman, D; Howard, S; Chhikara, RS; Brooks, FG. (2008). Moderate increases in ambient PM2.5 and ozone are associated with lung function decreases in beach lifeguards. J Occup Environ Med 50: 202-211. http://dx.doi.org/10.1097/JOM.0b013e31816386b4

Thompson, AM; Zanobetti, A; Silverman, F; Schwartz, J; Coull, B; Uch, B; Speck, M; Brook, JR; Manno, M; Gold, DR. (2010). Baseline Repeated Measures from Controlled Human Exposure Studies: Associations between Ambient Air Pollution Exposure and the Systemic Inflammatory Biomarkers IL-6 and Fibrinogen. Environ Health Perspect 118: 120-124. http://dx.doi.org/10.1289/ehp.0900550


Tolbert, PE; Klein, M; Peel, JL; Sarnat, SE; Sarnat, JA. (2007). Multipollutant modeling issues in a study of ambient air quality and emergency department visits in Atlanta. J Expo Sci Environ Epidemiol 17: S29-S35. [dx.doi.org/10.1038/sj.jes.7500625]

Torres, A; Utell, MJ; Morow, PE; Voter, KZ; Whitin, JC; Cox, C; Looney, RJ; Speers, DM; Tsai, Y; Frampton, MW. (1997). Airway inflammation in smokers and nonsmokers with varying responsiveness to ozone. Am J Respir Crit Care Med 156: 728-736.


Triche, EW; Gent, JF; Holford, TR; Belanger, K; Bracken, MB; Beckett, WS; Naeher, L; McSharry, JE; Leaderer, BP. (2006). Low-level ozone exposure and respiratory symptoms in infants. Environ Health Perspect 114: 911-916. [dx.doi.org/10.1186/1476-069X-6-37]

Tyler, WS; Tyler, NK; Last, JA; Gillespie, MJ; Barstow, TJ. (1988). Comparison of daily and seasonal exposures of young monkeys to ozone. Toxicology 50: 131-144.


Urch, B; Silverman, F; Corey, P; Brook, JR; Lukic, KZ; Rajagopalan, S; Brook, RD. (2005). Acute blood pressure responses in healthy adults during controlled air pollution exposures. Environ Health Perspect 113: 1052-1055.

Urch, B; Speck, M; Corey, P; Wasserstein, D; Manno, M; Lukic, KZ; Brook, JR; Liu, J; Coull, B; Schwartz, J; Gold, DR; Silverman, F. (2010). Concentrated ambient fine particles and not ozone induce a systemic interleukin-6 response in humans. Inhal Toxicol 22: 210-218. http://dx.doi.org/10.3109/08958370903173666

Vagaggini, B; Bartoli, ME; Cianchetti, S; Costa, F; Bacci, E; Dente, FL; Di Franco, A; Malagrinò, L; Paggiaro, P. (2010). Increase in markers of airway inflammation after ozone exposure can be observed also in stable treated asthmatics with minimal functional response to ozone. Respir Res 11: 5. http://dx.doi.org/10.1016/j.1655-9221-11-5

Vagaggini, B; Cianchetti, S; Bartoli, M; Ricci, M; Bacci, E; Dente, FL; Di Franco, A; Paggiaro, P. (2007). Prednisone blunts airway neutrophilic inflammatory response due to ozone exposure in asthmatic subjects. Respiration 74: 61-58. http://dx.doi.org/10.1159/000096078

Vagaggini, B; Taccola, M; Cianchetti, S; Carnevali, S; Bartoli, ML; Bacci, E; Dente, FL; Di Franco, A; Giannini, D; Paggiaro, PL. (2002). Ozone exposure increases eosinophilic airway response induced by previous allergen challenge. Am J Respir Crit Care Med 166: 1073-1077.

Vagaggini, B; Taccola, M; Conti, I; Carnevali, S; Cianchetti, S; Bartoli, ML; Bacci, E; Dente, FL; Di Franco, A; Giannini, D; Paggiaro, PL. (2001). Budesonide reduces neutrophilic but not functional airway response to ozone in mild asthmatics. Am J Respir Crit Care Med 164: 2172-2176.


Vesely, DL; Giordano, AT; Raska-Emery, P; Montgomery, MR. (1994a). Increase in atrial natriuretic factor in the lungs, heart, and circulatory system owing to ozone. Chest 105: 1551-1554.


Villeneuve, PJ; Doiron, MS; Stieb, D; Dales, R; Burnett, RT; Dugandzic, R. (2006b). Is outdoor air pollution associated with physician visits for allergic rhinitis among the elderly in Toronto, Canada? Allergy 61: 750-758. http://dx.doi.org/10.1111/j.1398-9995.2006.01070.x


VonKlot, S; Peters, A; Aalto, P; Bellander, T; Berglund, N; D'Ippoliti, D; Elosova, R; Hormann, A; Kulmala, M; Lanki, T; Lowel, H; Pekkanen, J; Picciotto, S; Sunyer, J; Forastiere, F; Group, HEOPOSSHS. (2005). Ambient air pollution is associated with increased risk of hospital cardiac readmissions of myocardial infarction survivors in five European cities. Circulation 112: 3073-3079. http://dx.doi.org/10.1161/CIRCULATIONAHA.105.548743


Watkinson, WP; Aileru, AA; Dowd, SM; Doerfler, DL; Tepper, JS; Costa, DL. (1993). Acute effects of ozone on heart rate and body temperature in the unanesthetized, unrestrained rat maintained at different ambient temperatures. Inhal Toxicol 5: 129-147.


Wentworth, P, Jr; Nieva, J; Takeuchi, C; Galve, R; Wentworth, AD; Dilley, RB; Delaria, GA; Saven, A; Babior, BM; Janda, KD; Eschenmoser, A; Lerner, RA. (2003). Evidence for ozone formation in human atherosclerotic arteries. Science 302: 1053-1056. http://dx.doi.org/10.1126.science.1089525

Wheeler, A; Zanobetti, A; Gold, DR; Schwartz, J; Stone, P; Suh, HH. (2006). The relationship between ambient air pollution and heart rate variability differs for individuals with heart and pulmonary disease. Environ Health Perspect 114: 560-566.


Wong, CM; Ma, S; AJ, H; Lam, TH. (1999a). Does ozone have any effect on daily hospital admissions for circulatory diseases? J Epidemiol Community Health 53: 580-581.

Wong, CM; Vichit-Vadakan, N; Vajanapoom, N; Ostro, B; Thach, TQ; Chau, PY; Chan, EK; Chung, RY; Ou, CQ; Yang, L; Peiris, JS; Thomas, GN; Lam, TH; Wong, TW; Hedley, AJ; Kan, H; Chen, B; Zhao, N; London, SJ; Song, G; Chen, G; Zhang, Y; Jiang, L; Qian, Z; He, Q; Lin, HM; Kong, L; Zhou, D; Liang, S; Zhu, Z; Liao, D; Liu, W; Bentley, CM; Dan, J; Wang, B; Yang, N; Xu, S; Gong, J; Wei, H; Sun, H; Qin, Z. (2010). Part 5. Public health and air pollution in Asia (PAPA): A combined analysis of four studies of air pollution and mortality. In Public Health and Air Pollution in Asia (PAPA): Coordinated Studies of Short-Term Exposure to Air Pollution and Daily Mortality in Four Cities (pp. 377-418). Boston, MA: Health Effects Institute. http://pubs.healtheffects.org/view.php?id=348

Wong, CM; Yang, L; Thach, TQ; Chau, PY; Chan, KP; Thomas, GN; Lam, TH; Wong, TW; Hedley, AJ; Peiris, JS. (2009). Modification by influenza on health effects of air pollution in Hong Kong. Environ Health Perspect 117: 248-253. http://dx.doi.org/10.1289/ehp.11605


Wu, CF; Kuo, IC; Su, TC; Li, YR; Lin, LY; Chan, CC; Hsu, SC. (2010). Effects of personal exposure to particulate matter and ozone on arterial stiffness and heart rate variability in healthy adults. Am J Epidemiol 171: 1299-1309. http://dx.doi.org/10.1093/aje/kwq060


Yang, CY; Chen, YS; Yang, CH; Ho, SC. (2004). Relationship between ambient air pollution and hospital admissions for cardiovascular diseases in Kaohsiung, Taiwan. J Toxicol Environ Health A 67: 483-493.


Zanobetti, A; Canner, MJ; Stone, PH; Schwartz, J; Sher, D; Eagan-Bengston, E; Gates, KA; Hartley, LH; Suh, H; Gold, DR. (2004). Ambient pollution and blood pressure in cardiac rehabilitation patients. Circulation 110: 2184-2189. http://dx.doi.org/10.1161/01.cir.0000143831.33243.d8

Zanobetti, A; Gold, DR; Stone, PH; Suh, HH; Schwartz, J; Coull, BA; Speizer, FE. (2010). Reduction in heart rate variability with traffic and air pollution in patients with coronary artery disease. Environ Health Perspect 118: 324-330. http://dx.doi.org/10.1289/ehp.0901003

