Polychlorinated biphenyls (PCBs)
$C_{12}H_{10-n}Cl_n$ (n=1～10)
[CAS No. PCBs: 1336-36-3, 42% chlorinated PCBs: 53469-21-9, 54% chlorinated PCBs: 11097-69-1]
Occupational carcinogen: Group 1

Summary of classification

The IARC raised polychlorinated biphenyls (PCBs) classification from Group 2A, "probable human carcinogen" (monograph Volumes 1 to 42, Supplement 7 [1987]), to Group 1, "human carcinogen" (monograph Vol. 107 [2015]), based on the judgement that there is sufficient evidence for carcinogenicity. The Japan Society for Occupational Health (JSOH) recommended an occupational exposure limit for PCBs in 2006 and classified it as Group 2A with respect to classification of carcinogenicity in 1991. Since a sufficient number of cohort and case-control studies has accumulated and significantly increased risk was observed for cancer of the liver and biliary tract[1-3] and malignant melanoma[4,5], we have now judged that there is sufficient evidence in the epidemiological data for the carcinogenicity of PCBs. Also, there is sufficient evidence from experimental animal studies for the carcinogenicity of PCBs in the liver[5-8]. In a mechanistic aspect, the aryl hydrocarbon receptor can modulate melanogenesis, which lends biological plausibility to the epidemiological findings of increased risks of melanoma after exposure to PCBs. Based on these findings, it is proposed that the classification for the carcinogenicity of PCBs be changed from Group 2A to Group 1.

Year of Proposal (revision): 2016
Year of Proposal: 1991 (Group 2A)

References

1) Mallin K, McCann K, D'Aloisio A, et al. Cohort mortality study of capacitor manufacturing workers, 1944-2000. Journal of Occupational and Environmental Medicine 2004; 46 (6): 565−576.
2) Yassi A, Tate R, Routledge M. Cancer incidence and mortality in workers employed at a transformer manufacturing plant: update to a cohort study. Amercian Journal of Industrial Medicine 2003; 44 (1): 58−62.
3) Pesatori AC, Grillo P, Consonni D, et al. Update of the mortality study of workers exposed to polychlorinated biphenyls (PCBs) in two Italian capacitor manufacturing plants. La Medicina Del Lavoro 2013; 104 (2): 107−114.
4) Ruder AM, Hein MJ, Nilsen N, et al. Mortality among workers exposed to polychlorinated biphenyls (PCBs) in an electrical capacitor manufacturing plant in Indiana: an update. Environmental Health Perspectives 2006; 114 (1): 18−23.
5) Loomis D, Browning SR, Schenck AP, et al. Cancer mortality among electric utility workers exposed to polychlorinated biphenyls. Occupational and Environmental Medicine 1997; 54 (10): 720−728.
6) Kimbrough RD, Linder RE. Induction of adenofibrosis and hepatomas of the liver in BALB-cJ mice by polychlorinated biphenyls (Aroclor 1254). Journal of the National Cancer Institute 1974; 53 (2): 547−552.
7) National Toxicology Program. Bioassay of aroclor for possible carcinogenicity. National Cancer Institute Carcinogenesis Technical Report Series 1978; 38: 1−62.
8) Kimbrough RD, Squire RA, Linder RE, et al. Induction of liver tumor in Sherman strain female rats by polychlorinated biphenyl aroclor 1260. Journal of the National Cancer Institute 1975; 55 (6): 1453−1459.