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## Persistent Organic Chemicals in Korea Marine Environment

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### EDUCATION

- 1970-1973 American College, Madurai, India  
Biology and Chemistry B.S.
- 1973-1975 American College, Madurai, India  
Biology and Chemistry M.S.
- 1977-1984 Madurai Kamaraj University, Madurai, India  
Biochemistry/Environmental Chemistry Ph.D
- 1985-1988 Ehime University, Matsuyama, Japan  
Ecotoxicology Ph.D

### EXPERIENCE

- 1999-2001 Visiting Professor, Madurai Kamaraj University, Lady Doak College,  
Madurai, India
- Since 2001 Director, Tamil Heritage Foundation, Germany (NPO) Adjunct Faculty  
member Tamil Virtual University, Chennai, India
- present Visiting Professor, South Sea Institute, Korean Ocean Research and  
Development Institute, Geoje-shi, Korea

### PUBLICATION

1. J.R. Oh, N. Kannan, S. H. Hong, H. K. Choi, W. J. Shim. A survey for persistent organic contaminants in the Yellow Sea Large Marine Ecosystem (Submitted to Archives of Environmental Contamination and Toxicology), 2006
2. N.Kannan, J.R.Oh, S.H.Hong, W.J.Shim Polychlorinated biphenyls(PCBs) in Korean Seafood: An indicator of coastal pollution and a threshold for potential effects on human

- health (Submitted to Fresenius Environmental Bulletin), 2006
3. N.Kannan, U.H.Yim, S.H.Hong, W.J.Shim, D.H.Li and J.R.Oh. PYE [2-(1-pyrenyl)ethyl-dimethylsilylated silica] column HPLC and HR-GC-(micro) ECD in the accurate determination of toxic co-planar PCBs and Polybrominated diphenyl ethers (PBDEs) The Bulletin of the Korean Chemical Society. 26,4: 529-536, 2005
  4. J.R.Oh, H.K.Choi, S.H.Hong, U.H.Yim, W.J.Shim, N.Kannan. A preliminary report of persistent organochlorine pollutants in the Yellow Sea. Marine Pollution Bulletin, 50, 217-222. 2005
  5. D.Li, M.Dong, W.J.Shim, S.H.Hong, J.R.Oh, U.H.Yim, J.H.Jeung, N.Kannan, S.R.Cho (in press) Seasonal and spatial distribution of nonylphenol and IBP in Saemangeum Bay, Korea. Marine Pollution Bulletin. 51, 966-974, 2005.
  6. N.Kannan, S.H.Hong, J.R.Oh Quantitation of Co-planar PCBs in 20 Different Commercial PCB Mixtures using Multi Dimensional Gas Chromatography and Electron Donor-Acceptor High-Performance Liquid Chromatography. Bull. Environ. Contam. Toxicol. 75:897-902. 2005
  7. J.R.Oh, S.H.Hong, U.H.Yim, W.J.Shim, N.Kannan. A survey of polychlorinated dibenzop-dioxins and furans in Korean Seafood - a congener-specific approach. Marine Pollution Bulletin, 50, 1121-1145. 2005
  8. Kodavanti,P.R.S., Kannan,N., Yamashita,N., Derr-Yellin,E.C., Ward,T.R., Burgin,D.E., Tilson,H.A., Birnbaum,L.S. (2001) Differential Effects of two lots of Aroclor 1254: Congener-specific analysis and neurochemical end points. Environ. Health Perspect. 109, 1153-1160. 2001
  9. Burgin,D.E., Diliberto,J.J., Derr-Yellin,E.C., Kannan,N., Kodavanti,P.R.S., Birnbaum,L.S. Differential Effects of two lots of Aroclor 1254 on enzyme induction, thyroid hormones, and oxidative stress. Environ. Health Perspect. 109, 1163-1168. 2001

KORDI Narayanan Kannan  
Ph.D., Dept. of Toxicology

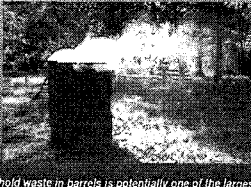
## Persistent Organic Chemicals in Korean Marine Environment

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Polychlorinated dibenzodioxins (dioxins) and polychlorinated dibenzofurans (furans) are highly persistent compounds with a strong affinity for sediments and a high potential for accumulating in biological tissues. They have been found in all compartments of the ecosystem, including air, water, soil, sediments, animals and foods. Dioxins and furans enter the environment as complex mixtures from four major sources: commercial chemicals (eg. pentachlorophenol), incineration, pulp and paper mills that use chlorine bleaching, and both accidental fires and spills involving polychlorinated biphenyls (PCBs, which contain principally furan contaminants).

Dioxin is formed by not only the combustion of organic materials with chlorine, but also by the following processes:

- waste burning in incinerators of various sorts
- backyard burn barrels
- Paper mills which use chlorine bleaching
- Polyvinyl Chloride (PVC) plastics
- Production of certain chlorinated chemicals

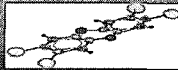


*"Open burning of household waste in barrels is potentially one of the largest sources of airborne dioxin and furan emissions in the United States". US EPA*

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## Health implications...

- 2,3,7,8-TCDD, is a "known human carcinogen"
- severe reproductive and developmental problems
- damage the immune system
- interfere with hormonal systems.



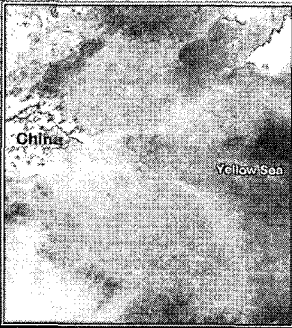
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Dioxin Exposure has been linked to

- birth defects,
- inability to maintain pregnancy,
- decreased fertility,
- reduced sperm counts,
- endometriosis,
- diabetes,
- learning disabilities,
- immune system suppression,
- lung problems,
- skin disorders,
- lowered testosterone levels
- and much more.

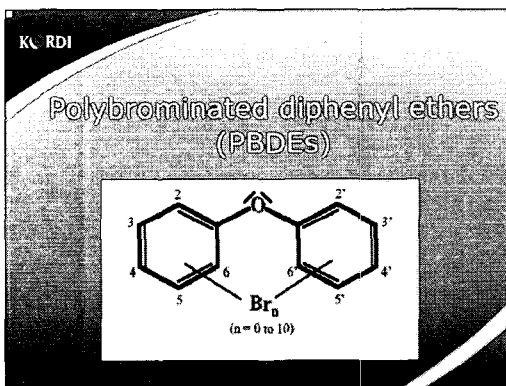
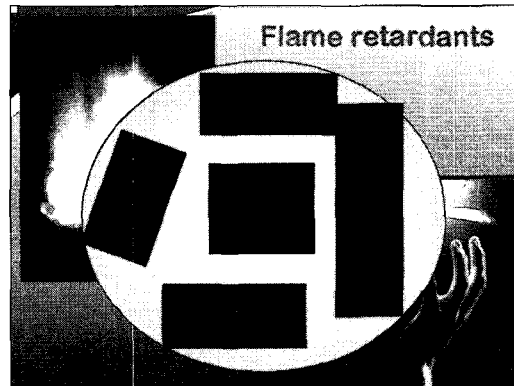
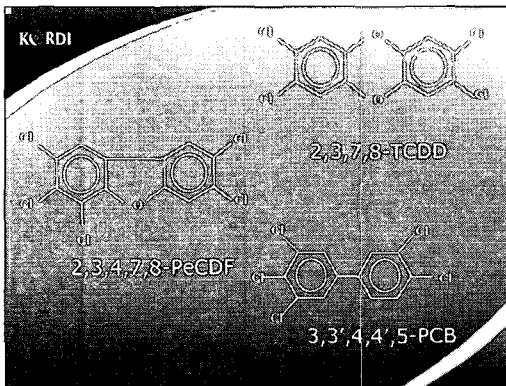
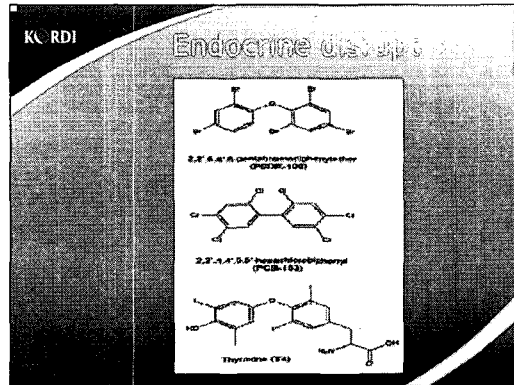
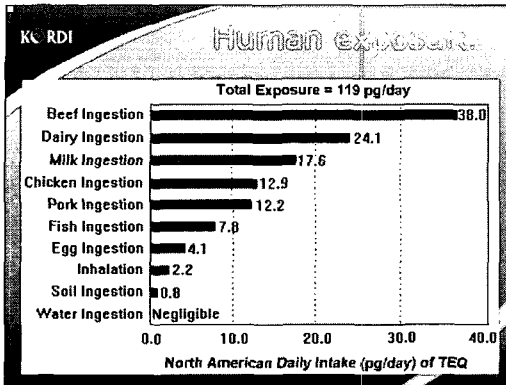
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## Trans-boundary migration of smoke in

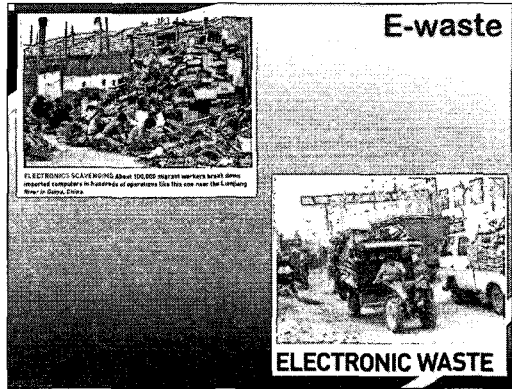


MODIS image - December 24, 2003

China Yellow Sea



- KC RDI
- ### Point Sources for PBDEs
- Plastics for electronic circuit boards and housings for personal computers and television sets
  - flame retardants in clothing and other textiles
  - home appliances and business machines
  - upholstered furniture
  - carpets and wall coverings
  - automobiles
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**KORDI** **Point Sources for PCBs**

Used in heat transfer fluids, hydraulic lubricants, dielectric fluids for transformers and capacitors, flame retardants, plasticizers, sealants and in carbonless copy papers.

**Environmental Persistence**  
 chemical and thermal stability  
 dielectric properties  
 lipophilicity

**KORDI** **Current sources of PCBs**

Shipbreaking  
 Removal of paint from waste to fill  
 Dredging

