Endocrine Disrupting Effects of Airborne Particle Matter and Their Responsible Constituents

2002 Fiscal Year Final Research Report Summary

Endocrine Disrupting Effects of Airborne Particle Matter and Their Responsible Constituents

Research Project

Project/Area Number

13672342

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Environmental pharmacy

Research Institution

Kanazawa University

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Keywords

airborne suspended participate matter / antiestrogenic effect / antiandrogenic effect / antagonist / aryl hydrocarbon receptor / polycyclic aromatic hydrocarbon / MCF-7 cell / PC3 cell

Research Abstract

There is an increasing environmental concern on exogenious chemicals that exhibit adverse effects on endocrine systems of human and wild life, so-called endocrine disrupting substances. Endocrine disrupting effects of airborne suspended particulate matter (SPM) has also attracted much attention. Therefore, wecollected SPM in Kanazawa, Ishikawa, and Sapporo, Hokkaido, at April, July, October and January. Then, we assayed their endocrine disrupting effects in cultured human-originated cell lines and investigated the responsible constituents. The results obtained are described below. 1. Everey SPM samples exhibited the antiestrogenic and antiandrogenic effects. 2. At both Kanazawa and Sapporo, SPM samples showed greater effect in winter than in summer. This was considered to be due to increased energy consumption

in winter compared with that in summer. 3. The endocrine disrupting effects of SPM samples were redued when the cells were treated with SPM samples in combination with an aryl hydrocarbon receptor (AhR) agonist. This results indicated that the endocrine disrupting effects were due in part to constituents acting as an AhR agonists. 4. Since polycyclic aromatic hydrocarbons (PAHs) are typical AhR agonists in environment, several PAHs were determined for their concentration in SPM samples and assayed for their endocrine disrupting effects. The results revealed that the endocrine disrupting effects of SPM samples are based in part on PAHs. 5. Competitive hormone receptor binding assay and yeast two-hybrid assay revealed that SPM samples contains the constituents capable to bind to estrogen receptor or androgen receptor as antagonists.

Research Products (13 results)

All Other

All Publications

[Publications] Ryoichi Kizu: "A Role of Aryl Hydrocarbon Receptor in the Antiandrogenic Effects of Polycyclic Aromatic Hydrocarbons in LNCaP Human Prostate Carcinoma Cells"Archives of Toxicology. 77(in press). (2003)

[Publications] Ning Tang: "Improvement of an Authentic HPLC System for Nitropolycyclic Aromatic Hydrocarbons : Removal of an Interfering Peak and Increasing in the Number of Analytes"Analytical Science. 19. 249-253 (2003)

[Publications] Akira Toriba: "Method for Determining Monohydroxybenzo[a]pyrene Isomers Using Column-switchihg High-Performance Liquid Chromatography"Analytical Biochemistry. 312. 14-22 (2003)

[Publications] Kazuichi Hayakawa: "Comparison of Polycyclic Aromatic Hydrocarbons and Nitropolycyclic Aromatic Hydrocarbons in Airborne Particulates Collected in Downtown and Suburban Kanazawa, Japan"Atmospheric Environment. 36. 5535-5541 (2002)

[Publications] Hideki Sasaki: "Simultaneous Determination of Monohydroxybenzo[a]pyrene Positional Isomers by Reversed Phase Liquid Chromatography Connected Online to Electrospray Ionization Mass Spectrometry"Biomedical Chromatography. 16. 432-436 (2002)

[Publications] Kazumasa Okamura: "Antiestrogenic Activity of Extracts of Diesel Exhaust Particulate Matter in MCF-7 Breast Carcinoma cells"Polycyclic Aromatic Compounds. 22. 747-759 (2002)

[Publications] 木津 良一: "機器分析化学"丸善. 155 (2002)

[Publications] Ryoichi Kizu: "A Role of Aryl Hydrocarbon Receptor in the Antiandrogenic Effects of Polycyclic Aromatic Hydrocarbons in LNCaP Human Prostate Carcinoma Cells"Archives of Toxicology. 77,in press.. (2003)

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[Publications] Hideki Sasaki: "Simultaneous Determination of Monohydroxybenzo[a]pyrene Positional Isomers by Reversed Phase Liquid Chromatography Connected Online to Electrospray Ionization Mass Spectrometry"Biomedical Chromatography. 16. 432-436 (2002)

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