

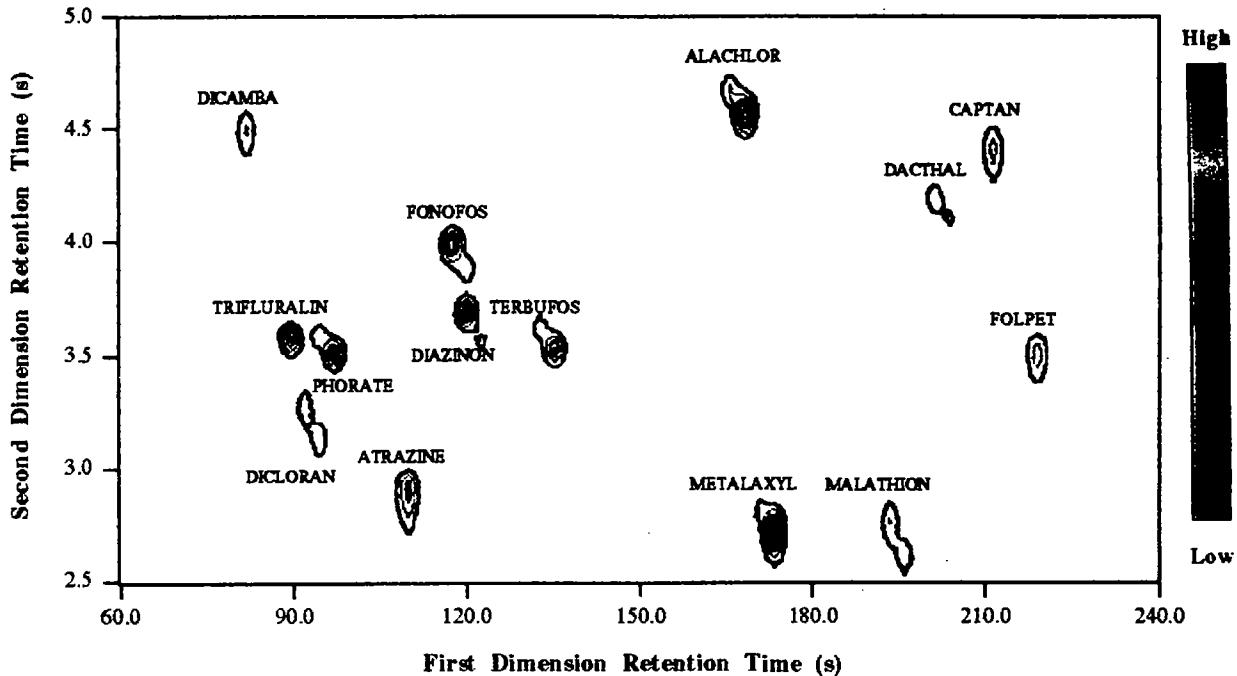
New Analytical Methods and a Summary of Future CDC Collaborative Studies

Donald G. Patterson, Jr., Centers for Disease Control & Prevention, National Center for Environmental Health, Division of Environmental Health Laboratory Sciences, Atlanta, Georgia, U.S.A.

Polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs), biphenyls (PCBs), and polyaromatic hydrocarbons (PAHs) are ubiquitous environmental contaminants. These compounds are formed in various combustion processes (automobile exhaust, waste incinerators, wood burning, cigarette smoke, etc.) as well as by-products in manufacturing (bleached paper, Aroclors, chlorinated phenols, wood preservatives, etc.). Certain congeners within these groups of compounds have been shown to be highly toxic to a number of animal species and are known or suspected human carcinogens. These toxicants have now been found in the lipid stores of humans from the general population with no known overt exposure. In the past, analyses for these toxicants in human matrices have involved a long labor intensive sample cleanup (even with automation) followed by high-resolution gas chromatography, high resolution mass spectrometry. We will present the current state of our efforts to speed up the sample preparation and analysis for these compounds (thereby reducing the cost and allowing larger studies to be conducted). We will also present newer techniques for biological monitoring of PCDDs, PCDFs, PCBs, and PAHs as well as for various other halogenated organic compounds (e.g., herbicides, fungicides, insecticides). These techniques include: comprehensive two-dimensional gas chromatography (2DGC); supercritical fluid extraction (SFE); cyclodextrin modified micellar electrokinetic chromatography (CD/MEKC); and superficially hydrophilic reversed phase liquid chromatography (SHRP-LC). An example of the combination of two of these techniques (SFE and 2DGC) is shown in the following two Figures. The first Figure shows the high-speed comprehensive two-dimensional GC (C2DGC) separation of 14 chlorinated pesticides in less than four minutes. The second Figure shows a serum SFE extract analyzed by C2DGC. CDC is collaborating with a number of researchers concerning future studies that are in various stages of development for assessing potential health effects associated with exposure to environmental toxicants. The goals and objectives of these various studies will be discussed.

High-Speed 2D Gas Chromatogram of A Pesticide Mixture

First column: 2.0-m x 250- μ m i.d. with 0.25- μ m DB-1 stationary phase; Second column: 75-cm x 100- μ m i.d. with 0.05- μ m OV-1701 stationary phase. Chromatographic conditions: oven temperature at 120°C for 0.3 min, programmed at 15°C/min to 180°C. Hydrogen as carrier gas at 12.6 psi inlet pressure.



Two-Dimensional Chromatogram of a SFE Extract of a Pesticide-Spiked Serum Sample

