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Environmental Monitoring
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Las Vegas, NV 89193-3478

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Project Summary

Protein Adducts for Exposure Monitoring: A Computerized Database (Software and User's Manual)

F. C. Schnell and Charles H. Nauman

This user's manual contains directions for installing and using the Computerized Protein Adducts Database (CPAD). Most of this documentation is also available on-screen in the form of CPAD's "Readme" files and program prompts. CPAD, a user-friendly, menu-driven, stand-alone DBASE™ application provides an efficient means of updating and disseminating information on protein adducts relating to their use as dosimeters of exposure to environmental contaminants, especially genotoxic and carcinogenic compounds. The structure of the database as well as its initial contents were derived primarily from the document, "Protein Adduct-Forming Chemicals for Exposure Monitoring: Chemicals for Further Study," EPA/600/4-89/035.

Software for executing CPAD accompanies the User's Manual on a single high-density 3.5" diskette. The diskette contains (1) two versions of CPAD that run with DBASE™ III PLUS and DBASE™ IV, version 1.1, respectively, (2) the DBRUN™ files needed to run CPAD as a stand-alone DBASE™ III PLUS application, (3) a copy of the User's Manual (a WORDPERFECT™ 5.0 document file), which may be viewed on-screen or printed out, and (4) the source code and unlinked object code files used to develop CPAD's main program. The latter files are not required to run CPAD and are included only for the information of users who may be interested in the program's design.

This Project Summary was developed by EPA's Environmental Monitoring Systems Laboratory, Las Vegas, NV, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Information

The U.S. Environmental Protection Agency (EPA) generated an initiative to develop, refine, and apply appropriate biomarkers for use in conjunction with environmental monitoring data to provide better estimates of exposure and risk to individuals and populations. Among the biomarkers under study are macromolecular adducts formed *in vivo* by reactive environmental chemicals or their metabolities.

A report entitled "Protein Adduct-Forming Chemicals for Exposure Monitoring: Literature Summary and Recommendations, EPA/600/4-90/007, summarized the literature regarding adducts formed by xenobiotics with proteins, particularly hemoglobin and serum albumin, and examined the feasibility of their use as dosimeters of exposure. Twenty-two chemicals were recommended for further study and ranked according to their potential use in exposure monitoring by protein adduct-based methods. These prioritized chemicals were then examined in greater detail in a report entitled "Protein Adduct-Forming Chemicals for Exposure Monitoring: Chemicals Selected for Further Study," EPA/600/4-89/035.

Due to rapid developments in the field of molecular dosimetry, information in the project report (EPA/600/4-89/035), as well as the prioritized chemicals list, could possibly require frequent amendents and up-

dates in the future. To facilitate that process, the Computerized Protein Adducts Database (CPAD) was developed. The structure of the database as well as its initial contents were derived primarily from the aforementioned project report. The database includes entries on the following topics: manufacture and use, sources and levels of exposure, known health effects, metabolism (detoxification and activation), host factors, reactive metabolities, adduct characterization, rates of adduct formation (i.e., second-order rate constants), background adduct levels, dose-response relationships, and methods of adduct detection.

Procedure

CPAD is intended to run on an IBM-compatible PC with hard disk under DOS. It can be run from a 3.5" drive, but this is not recommended, as program execution is slowed down considerably.

The DBASE™ III PLUS Version

This version of CPAD may be used with or without DBASE™ III PLUS. If your computer has DBASE™ III PLUS installed, only the files in the CPAD.DB3 Directory of the 3.5" CPAD diskette need to be copied to a separate subdirectory on your hard drive (e.g., c:\CPAD). These files will require approximately 270 K of memory. If your computer does *not* have DBASE™ III PLUS installed, then the three DBRUN files provided must also be copied into the CPAD directory on your hard disk. The resulting stand-alone version of CPAD requires a total of 605 K.

The DBASE™ IV (1.1) Version

For the benefit of those who have DBASE™ IV, version 1.1, installed on their computers, a compatible version of CPAD is included on the CPAD diskette. To install this version of CPAD, simply copy all the files from the CPAD.411 directory of the CPAD diskette to a separate directory on your hard drive (e.g., c:\CPAD). You will need only about 325 KB of disk space for the DBASE™ IV version. A stand-alone (Runtime) DBASE™ IV, 1.1 version of CPAD is not included, because it would require a million bytes more than the stand-alone DBASE™ III PLUS version.

Operation

Getting Started

To run either version of CPAD, simply enter "START" from within the subdirectory that contains the CPAD files (and the three DBRUN files, in the stand-alone version). Alternatively, the compatible version of CPAD may be run from within DBASE™ III PLUS or DBASE™ IV by entering "DO PADDUCTS" or "DO MAINMENU," respectively, at the dot prompt, *provided* that (1) DBASE™ is loaded from within your CPAD directory, thereby making it the default directory, and (2) the DBASE™ directory is in your PATH statement.

Searching the Database

The main menu of CPAD is a scrolling, alphabetical list of chemicals for which records exist in CPAD. When a chemical is selected, the main menu closes and the field-selection menu opens. The user may choose one of three options: (1) view only those fields containing information on the selected chemical, (2) view only those fields containing information on the protein adducts formed by the chemical, or (3) browse through all the data fields on the selected chemical. Chemical Data Fields include CAS Number, Synonyms, Volume and Method of Manufacture, Major Uses, Sources and Levels of Exposure, Health Effects, Metabolism, and Host Factors. Protein Constant Adduct Data Fields include Reactive Metabolites, Adducts Formed, (second order) Rate Constant (of formation), Background Levels (of adducts), Dose-Response Data, Methods of Detection, and References. After selecting 1 or 2 above, the user may select to view individual data screens or browse through all data screens (i.e., Chemical or Protein Adduct) in sequence.

Modifying the Database

Existing data on a selected chemical may be edited/updated at the appropriate data screen by entering Edit Mode. The Delete Menu works the same way the Main Menu does, except that the entire record for the selected chemical is deleted if the user's intent to do so is confirmed at the prompt. The Add Menu allows the user to add new records (i.e., chemicals and CAS numbers, only). A Duplicate Entry Protection Feature keys on CAS number rather than chemical name. Any new chemical names added at the Add Menu will subsequently appear in the alphabetical listing at the Main Menu. All other data for new records is keyed in at the individual data display screens in input mode, after selecting the new chemical at the Main Menu.

Software Availability

The Computerized Protein Adducts Database (CPAD) can be obtained by sending a single, formatted, high-density (1.44 MB), 3.5" diskette to the following address:

Dr. Charles H. Nauman
USEPA, EMSL, MC-EAD
P.O. Box 93478
Las Vegas, NV 89193-3478

The CPAD Software, the accompanying User's Manual, and the protein adducts project reports (EPA/600/4-90/007 and EPA/600/4-89/035) were written by Dr. Frank C. Schnell. He may be contacted at the following address:

Lockheed Engineering and Sciences Company
1050 E. Flamingo Road
Las Vegas, NV 89119

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Frank C. Schnell is with Lockheed Engineering and Sciences Co., Las Vegas, NV 89119. The EPA author, ***Charles H. Nauman*** *(also the EPA Project Officer, see below), is with Environmental Monitoring Systems Laboratory, Las Vegas, NV 89193-3478.*

The complete report, entitled "Protein Adducts for Exposure Monitoring: A Computerized Database: (Software and User's Manual)," (Order No. PB92-501 873/AS; Cost: $90.00; subject to change) will be available only from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650

The EPA Project Officer can be contacted at:

Environmental Monitoring Systems Laboratory
U.S. Environmental Protection Agency
Las Vegas, NV 89193-3478

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Research Information
Cincinnati, OH 45268

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