POINT COUNTING STEREOLOGY SYSTEM I

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Point Counting Stereology (PCS) System I includes a book and four computer programs that were written to simplify the application of stereology to problems in cell biology (1,2). The purpose of this presentation is to summarize the capabilities of the system and to consider future applications of the system to stereology, biochemistry, and image analysis.

The book is divided into four parts. Part I presents an overview of the PCS System I and includes an introduction, a brief discussion of the overall system, and a description of the computer hardware. Part II includes step-by-step tutorials for the four program modules. The tutorials use a sample run to illustrate how the modules collect and analyze point counting data. Part III is the Reference section and provides summary documention for the PCS programs. Part IV includes introductory information about biological stereology, a discussion of test grids, suggestions for interpreting stereological data, and comments on changing units of measurement. A glossary of symbols and terms is also included.

The programs are written in BASIC for the Tektronix* 4052A microcomputer (Beaverton, OR). A COUNTING MODULE collects point counting data in either Density Mode (points, intersections, transections, profiles) or a Boundary Mode (intersections with complete nuclear profiles). This information is stored on tape or disk files and can also be printed. The module includes routines for storing experiment indexing information, collecting the calibration information needed to calculate magnification, naming point counting keys, and collecting, editing, and storing point counting data. A DENSITY MODULE

estimates volume density, surface density, length density, and numerical density. Routines are included for inputing data from one or more data files, displaying information about input files, changing units of output, and assembling compartments (i and reference) for estimating the densities. An algorithm is used that allows data files to be merged even when they were collected at different magnifications and with different test grids. A B-BAR MODULE (3) estimates the numerical density of cells and the volume, surface, length, and numerical densities of compartments i in an average cell or in one million cells. A FORMAT MODULE reformats the point counting data collected with the COUNTING MODULE so that they can be analyzed statistically with selected Tektronix software.

PCS System I is currently being implemented in the C language to make the programs portable to most microcomputers and to minicomputers running UNIX* or other operating systems. The development work is being done on an IBM* PC. Since general purpose microcomputers are widely available and relatively inexpensive, we hope that this will be an effective means of broadening the use of stereological techniques.

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* IBM is a trademark of International Business Machines Corporation.
* UNIX is a trademark of Bell Laboratories.

REFERENCES

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3. Bolender RP. Methods for decreasing the statistical variation of stereological estimates. Anat Rec 1983; 207:89-106.