A Comparison of Automated Data Collection and Manual Data Collection for Toxicology Studies

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Abstract. Automated data collection was compared with manual data collection in terms of accuracy and man-hours devoted to data manipulation and checking. The comparison was based on experience with an automated data collection system (DOLPHIN)TM developed at Toxigenics for use in conducting toxicological studies. It was found that on-line data collection increases the quality of the data gathered because: 1) it facilitates scientific observation by displaying historical data and statistics on changes since the last observation period; 2) it virtually eliminates errors due to oversight and transcription; 3) it allows more careful monitoring of the course of the study by providing immediate access to interim summary statistics; 4) it provides complete documentation of all changes made to the data after initial collection. In addition, automated data collection enables more rapid completion of the final report of results because: 1) fewer departmental transfers are required; 2) auditing by Quality Assurance (Q.A.) personnel is facilitated.

Key words: Automatic data collection – Computers – Automatic data processing – Toxicology

Toxicological studies typically require the collection of a large amount of data. Environmental parameters and test article exposure concentrations are monitored. Body weights, food consumption and detailed observations of the test animals are collected at frequent intervals. Data on organ weights, and pathology are recorded. Even in subchronic studies this can result in tens of thousands of data points. Generally this data is recorded manually and then transferred to a computer for statistical analysis.

Modern computer technology now makes it economical to collect much of this data directly on-line. Since there are inevitable start-up costs in converting
to an automated system, it is important to determine whether there are significant benefits to be gained. To address this question, an automated data collection system (DOLPHIN)™ developed at ToxiGenics was compared with manual data collection in terms of accuracy and man-hours devoted to data manipulation and checking.

In the DOLPHIN™ system in-life data is collected using a portable unit that consists of a CRT terminal, a bar code reader, and a balance connected to a micro computer. The unit is wheeled into the animal rooms to collect body weights, food weights, and detailed observations. Observations are entered using the keyboard, and weights are recorded electronically. When all the data is collected, it is electronically transferred to a main-frame computer for statistical analysis and report generation.

An on-line system is also used to collect necropsy data, clinical pathology data, and histopathology findings.

Method

Two approaches were taken to assess whether the DOLPHIN™ system provided significant advantages over manual data collection procedures. First, study directors, technician supervisors and Quality Assurance personnel were polled to determine the major advantages and disadvantages of an on-line data collection system from their perspective. Second, the two methods of data collection were compared in terms of number of procedures required to check and process the data prior to completion of the final report.

Results

The on-line system was found to be favored over manual data collection in a number of respects. Table 1 presents the primary advantages mentioned by the individuals polled.

Quality of Data

There was general consensus that an on-line system results in higher quality data. One reason is that the system prompts technicians for all required information. Thus, errors due to oversight (e.g., forgetting to record the date; skipping an animal) are virtually eliminated. In addition, values such as body weight gained and food consumed are computed and presented to the technician. This allows potential problems (e.g., spilled food, wrong animal) to be identified and acted upon immediately.

DOLPHIN™ users also felt that the system increases the quality of detailed observations made. One reason is that a menu of possible observations is displayed. This promotes greater consistency among technicians. A second reason is that DOLPHIN™ displays the observations reported for the animal in