MICROCOMPUTER ANALYSIS OF SENSORY-EVOKED CONVULSIVE ACTIVITY.

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An analysis package had been produced to quantify the sensory evoked electromyographic activity induced by administration of the convulsant agent catechol in urethane-anaesthetised rats. Typically this activity, recorded from forelimb muscles to electrical stimulation of cutaneous afferents, consists of three components, each the result of activation of a different reflex pathway (Angel and Dewhurst, 1978). The longer latency components of this muscle reponse are of variable latency and are thus difficult to analyse using conventional averaging techniques. These components, which are of supraspinal origin, are of interest since they are inhibited by anticonvulsants effective against tonic-clonic convulsions but not by those effective against absence seizures (Dewhurst, 1986), and could provide a useful animal model for the study of such seizures.

Evoked electromyographic activity (stimuli applied at a rate of 0.17 Hz) is induced by i.v. infusion of catechol; test drugs are adminstered after a suitable control period and recording is continued for up to 1 hour. Records are initially stored on magnetic tape (Trio KX 440) and then transfered either manually or automatically in batches of say 20 to a BBC model B microcomputer (Basarab-Horwath et al, 1986) for analysis.

The analysis program is menu driven and allows latency windows, appropriate to each component of the evoked EMG, and voltage gates to be set up for individual experiments. For each waveform, the peak-peak amplitude and latency of the largest component within each window is measured and for batch analysis the number of times each component occurs per applied stimulus is also calculated. In addition the area of evoked activity occuring within each latency window is also measured. Mean values $\pm$ SEM are then calculated for each parameter and printed out.

The program menu also allows the display of individual waveforms on a monitor with the facility to superimpose, obtain a hard copy and store in a file on diskette. This is extremely useful in illustrating drug effects and examples will be included in the demonstration.

The system described has been designed specifically to analyse catechol-induced evoked EMG's but the program could be readily modified to enable any complex waveform to be analysed by a range of statistical methods.

Angel A and Dewhurst D G (1978) Brit J Pharmac 64:539-544
Basarab-Horwath I, Dewhurst D G, Meehan A S. Odusanya S (1986) J Physiol (in press)
Dewhurst D G (1986) Brit J Pharmac (in press)

COMPUTER-SIMULATION PRACTICAL TEACHING USING THE BBC MICRO-
COMPUTER: PROPERTIES OF .NERVE.

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The frog sciatic nerve preparation is a common practical taught on a
variety of undergraduate courses to illustrate some of the properties of
nerve. These practicals often involve the use of relatively large numbers
of animals and, if they are not conducted as a tutor demonstration,
require expensive electrophysiological equipment which is often not
available. In contrast most educational institutions have a number of BBC
microcomputers sometimes networked on an Econet system. For some of these
courses it is not essential that students actually perform the practical
but that they are exposed to an alternative method of teaching ie
laboratory-based, in order to present theoretical concepts. For these
students we have produced a computer simulation of the frog sciatic nerve
practical, in which students are presented with high resolution
simulations of compound nerve action potentials as displayed on an
oscilloscope screen.

The data used to produce the simulated action potentials are taken from a
`live' experiment and transferred to the BBC microcomputer from a digital
storage oscilloscope (Nicolet 3091) via an RS232 link (Basarab-Horwath et
al, 1986), and a data file created on disk. In order to perform
individual experiments, students then access this data file.

The program is menu-driven and has been designed to allow student
interaction and enable them to work at their own pace. Individual
experiments are prefaced by concise textual information, and followed by
assignments which students would be expected to complete in writing up the
practical. The package as a whole has been produced assuming the
availability of only the minimum hardware ie BBC model B microcomputer
monitor. The program is written in basic and is contained on a
single-sided diskette.

Basarab-Horwath I, Dewhurst D G, Meehan A S, Odusanya S (1986) J Physiol
(in press)

A PHARMACOLOGY 'SHORT NOTES' TUTOR WHO WORKS FOR NOTHING AND NEVER GETS IT WRONG

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Medical and dental students are often expected to be familiar with a limited number of important characteristics of a large number of drugs and disorders. Knowledge of this information is often examined by the 'write short notes on.....' type of question where students are expected to select the relevant important points and present them in one to two hundred words.

The pharmacology 'short notes tutor' consists of a suite of programs written for the BBC microcomputer in BBC BASIC (and therefore readily translatable to other dialects of BASIC). It presents, for a particular topic, up to 20 lines (40 characters per line; approx 150 words) of short notes from which up to 20 essential words have been omitted and are represented by sets of asterisks. It is the student's task to supply (through the keyboard) the missing words. Omissions can be tackled in any order; if an unacceptable word is offered the program permits repeated attempts until the student supplies an acceptable answer (from up to 4 possibilities) or asks for the correct one. Once an acceptable answer has been obtained, a section of explanation (up to 7 lines) is displayed on the screen. This may provide additional information to set the answer in context or to extend the student's knowledge in depth or breadth. The student is not allowed to leave the program until all the omissions have been filled in and the explanations presented. At this point an overall score is given for that particular short notes section. Up to 20 sections can be accommodated on a standard floppy disc.

Full records are maintained of how a class coped with each section so that problems affecting the class as a whole can be identified and the teaching amended appropriately. A friendly editing and authoring package is available to enable teachers with no specialist knowledge of computers to write their own material and to edit existing material.

Individual learning deficiencies are corrected by the program and the repeated reading of the text helps retention of correct and important material. The 'tutor' is popular with our students; they believe it helps them acquire knowledge of the important features of the multitude of drugs and disorders they encounter.

It is not intended that this 'tutor' completely replace the more expensive human version but in these days of staff shortages it provides an alternative learning aid which students can use at their own pace without making demands on staff time.

A SIMPLE INEXPENSIVE METHOD OF STORAGE AND ANALYSIS OF DATA FROM PHARMACOLOGICAL CONCENTRATION RESPONSES

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The storage of sets of data comprising large numbers of data items can be costly both in terms of the time spent filing the data and also in usage of available filespace. Further analysis of this data at a later date is even more time consuming if the data must first be located and retrieved from files which may have previously been stored in archives. The storage of concentration-response data is particularly difficult in that analysis may be required between tissues or, alternatively, between different curves in a single tissue.

We have designed a simple but effective computer system, named 'DATAFILE' in order to overcome some of these problems associated with the storage, retrieval, and analysis of the data obtained from pharmacological concentration response curves.

DATAFILE was designed as a simple to operate ('user-friendly'), menu-driven, data-storage system, allowing the stored data to be readily available for subsequent and varied analysis and plotting. Whilst the system has been written primarily on and for the BBC model B microcomputer it will function equally well with a BBC B+ and/or a second processor.

The minimum requirements for the system in terms of disc-drives are (a) a double sided, single disc drive or (b) a single sided, double disc drive. However, due to the limitations of the BBC disc filing system (i.e. a maximum of 31 files per side of diskette) a double sided, double disc drive is preferable, thus reducing the number of datadiscs necessary.

Within DATAFILE there is scope for analysis of the stored data. For example, expression of the tissue response as a percentage of its own maximum or another entered value, changes in tension, absolute tension. DATAFILE can be used to plot stored data using an Epson printer. Stored data can also be converted directly to a format which may be used with the INSTAT statistics package available for the BBC microcomputer thus allowing more sophisticated data analysis and plotting.

In summary, the advantages of the system are that data is simple to enter and may be rapidly retrieved for analysis, print-out, or plotting. Disc storage of data, with the appropriate back-up discs, reduces filing space demands. As the raw data is in a form which is readily available for analysis by INSTAT, statistical analysis can be repeatedly performed without re-entering data. The filing system used also allows data from different experiments to be compared directly.