173P A FOUNDATION LEVEL COMPUTER-BASED INTERACTIVE TUTORIAL TO INTRODUCE THE PHYSIOLOGY OF THE ENDOCRINE SYSTEM TO UNDERGRADUATE STUDENTS

D. G. Dewhurst & D. Davies, School of Applied Sciences, Faculty of Health & Social Care, Leeds Metropolitan University, Calverley Street, Leeds LS1 3HE.

Computer-based learning (CBL) programs aimed at undergraduate students are now widely used either to enhance or sometimes replace traditional teaching methods. CBL has certain advantages. It promotes active learning, gives students control of when they learn and the pace of their learning, and it may save staff time. Here we demonstrate an interactive tutorial which aims to teach the basic physiology of the endocrine system. It is suitable for first year undergraduates from a range of biological science, medical and health-related courses and may be used for both primary learning, revision and as a remedial teaching resource.

The program was developed using Multimedia Toolbook® (Asymetrix) to run on IBM PC compatibles (minimum delivery platform: 486 PC running Windows™ version 3.1 or better (Microsoft), a 256 colour VGA monitor and a mouse).

The main menu has three options, which may be accessed in any order: *introduction*: an overview of the function of the endocrine system, location of some of the important endocrine glands and the hormones they secrete; *chemical properties of hormones* : covers the three main chemical groups of hormones: peptides and glycoproteins, steroids and amines, giving examples of each. For each group the program describes the synthesis, transport and physiological implications of the chemical properties; *cellular mechanisms of action* covers the main features of how (i) peptide and catecholamine hormones act at the cellular level (second messengers) and (ii) steroids and thyroid hormones act at the cellular level; *hypothalamus - pituitary* : describes the anatomy of the structures and the relationship and connections between the hypothalamus and the pituitary gland; the hormones of the anterior and posterior lobes, regulation of their release and main physiological functions.

High quality colour graphics are used extensively throughout the program and features such as animation and a hotword facility are used to enhance student learning. The program is highly interactive and uses several features to promote this. For example the main sections all have associated student tasks/self-assessment questions e.g. true/false questions with feedback, drag-and-drop exercises. These are designed to allow students to assess their understanding of the section they have completed and also to present additional information and explanations through the feedback.

The learning package is intended to be used either to support existing teaching methods or for independent study where it could be used as an alternative to staff-led tutorials or lectures. It is estimated that it would occupy students for two to three hours of fairly intensive study and is suitable for primary learning or revision. The question-answer sections may also be useful for self-assessment.

It is intended that additional modules covering specific endocrine glands in more detail e.g. thyroid, parathyroid hormones and vitamin D in control of plasma calcium levels, and insulin and glucagon will be developed.

174P MUSCLE PHYSIOLOGY: AN INTERACTIVE TUTORIAL BASED ON EXPERIMENTS CONDUCTED ON FROG SCIATIC NERVE - GASTROCNEMIUS MUSCLE PREPARATION

D. G. Dewhurst & S. Mistri, School of Applied Sciences, Leeds Metropolitan University, Calverley Street, Leeds LS1 3HE.

A recent demonstration to the Society (Dewhurst & Joshi, 1997) showed a computer-based simulation of a series of experiments conducted on the isolated sciatic nerve of the frog which is a common undergraduate laboratory practical. This program combined simulated data with a student workbook containing exercises and tasks for students to complete after they had gathered the data. Here we demonstrate a similar program which simulates experiments on the isolated sciatic nerve-gastrocnemius muscle preparation of the frog to teach some of the properties of skeletal muscle. This program is based upon an earlier version, also demonstrated to the Society (Brown & Dewhurst, 1987), which provided data only.

The program was developed using Multimedia Toolbook® (Asymetrix) to run on IBM PC compatibles with the following minimum delivery platform: 486 SX PC running Windows™ version 3.1 (Microsoft), a 256 colour VGA monitor and a mouse.

It is menu driven and includes sections on: the preparation and its removal from a pithed frog; apparatus and methods of stimulating and recording; and an *experiments* section which provides data, derived from actual experiments. These include: stimulus voltage/response relationship; effect of paired supramaximal stimuli to illustrate summation; effect of different frequency of stimulation to illustrate fused and unfused tetanus; action of curare (on muscle contraction and compound nerve action potential0; length-tension relationship in sartorius muscle.

Simulated responses are displayed on a screen display which emulates either an oscilloscope or a chart-recorder. Students are expected to take measurementsdirectly from the monitor display. There is a protocol for each experiment which explains how the data were recorded, how the student can select the variable (e.g. stimulus voltage applied to the nerve) and what the student is expected to measure from the screen display.

Each experiment also has a number of tasks associated with it. For example, there are multiple-choice and true/false questions with feedback relating to collection of data, interpretation of the results and the physiological properties of skeletal muscle. The information to enable them to answer some of the factual questions is not contained within the program which should encourage reference to additional learning materials.

The previous program has been used successfully, to replace the traditional laboratory practical class, for many years in my university. Whether the new program could be equally useful to others depends, to some extent, on whether teachers are willing to accept the interactive tasks posed by the program as part of their curriculum. One advantage of having the student workbook in a paper-based format is that teachers can decide whether they want to use it as it stands or modify it to suit their own requirements.

Brown, G. and Dewhurst, D.G. (1987) *Br. J. Pharmacol.* 92, 790P.
Dewhurst, D.G. and Joshi, P. (1997) *Br. J. Pharmacol.* (in press).