A NEW PHOTOMETRIC METHOD FOR QUANTIFYING ERYTHEMA INDUCED BY UV-B IRRADIATION

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Although a number of methods have been described for assessing erythema (skin redness), subjective evaluation is the method most commonly described in the literature. However this method (using an arbitary scoring system 0-5) is inadequate for the precise characterisation of the skin erythema response.

We have recently developed a new photometric system (the erythmometer) which can objectively quantitate erythema. The key components of the erythmometer are a light emitting diode, L.E.D. (green = 545nm), a short optical guide and a photodiode. These are arranged coaxially with the L.E.D close to the skin and as this is a "cold" light source it causes no colour changes itself. The symmetrical design of the device ensures that it gives repeatable results regardless of orientation about the normal. The L.E.D. beam is reflected back from the skin surface and detected by the photodiode, its output then passing to a digital voltmeter, reading to one decimal place. The apparatus is pocket sized and can be driven by a 9 volt battery.

The erythmometer was evaluated in the domestic pig. The instrument was first calibrated for redness using a colour atlas (ICI). The back of the pig was then irradiated with UV-B light. The time course of the ensuing inflammatory response was then quantified at regular intervals using both the erythmometer and subjective assessment. The inflammatory responses were also photographed. A good correlation between objective and subjective assessment was observed. However, the erythmometer not being confined to the 0-5 subjective scale, gave a better discrimination of peak inflammatory activity. Moreover, unlike subjective evaluation, its readings were independent of both ambient light and operator bias.

A MICROCOMPUTER SYSTEM FOR LONG-TERM MONITORING AND ANALYSIS OF LOCOMOTOR ACTIVITY

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Manual analysis of the large amounts of data produced by long term monitoring of locomotor activity is tedious and time consuming. We have developed an inexpensive system, based on the BBC microcomputer, which completely automates the collection and subsequent analysis of such data.

Data from up to 8 locomotor activity meters(LAMS) is carried by a multicore cable which may be up to 75 meters long to an interface unit connected to the parallel input port of the computer. The LAMS have been modified so that each locomotor event results in the closure of a relay which in turn shorts the appropriate interface input to earth causing a bi-stable circuit to change state. The new state of the bi-stable is retained until reset by a signal from the computer. This latching action captures each locomotor event until the computer is ready to collect it obviating the need for the computer to continually scan the inputs at high speed looking for irregularly spaced transient events.

The computer collects data from the interface under the control of a short machine code interrupt routine. The hardware interrupts which call this routine are generated every 50msec by an internal clock. The interrupt routine reads the current state of the bi-stable representing each of the LAMS and when an event has occured increments a counter before resetting the bi-stables to await further events. A programme written in BASIC controls the overall progress of the experiment and interacts with the user to allow him to set the interval over which counts are to be accumulated. At the end of each interval the totals are recovered from the counters and written to floppy disk. Each set of data is uniquely identified by writing with it the day, hour and minute of collection. The current status of the experiment is also stored on disc and is updated each time data is written. This in conjunction with the unique identification of each set of data allows rapid recovery from crashes. The data collected from each LAM can be displayed on the V.D.U. as an actogram to aid assessment of the progress of an experiment while data collection continues. Up to 95 days of data sampled at 15min intervals from 4 LAMS can be stored on a single 100K disc and if dual disc drives are available the system can switch automatically to the second drive when the disc on the first is filled.

Data from a completed experiment is analysed using a second program written in BASIC. The results for each LAM are presented in two forms, firstly as an actogram plotted on the printer which facilitates identification of long term trends in locomotor activity and secondly as a histogram of total locomotor activity per day.