MechanoCulture

Strainable Substrate for Culturing Cells

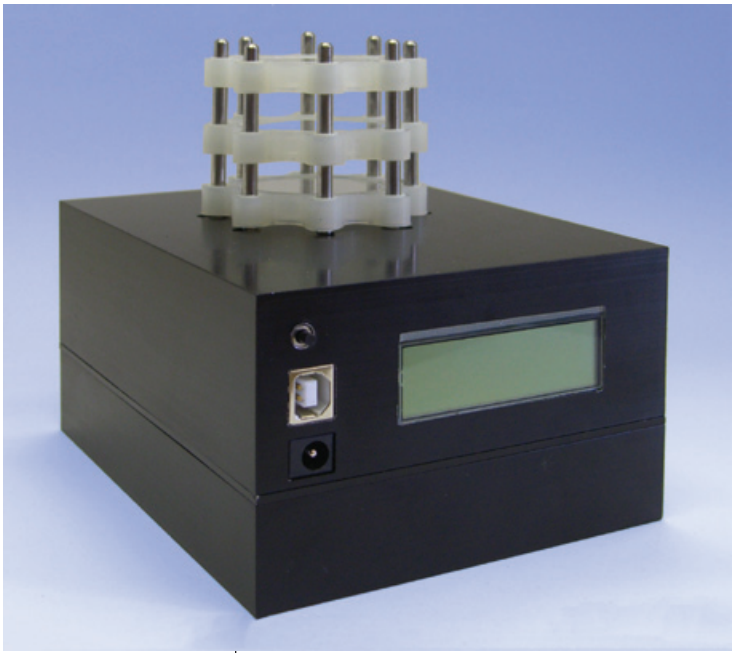

Fig.1—The MechanoCulture Base Unit has three silicone membranes

The MechanoCulture system was developed to allow researchers to culture cells on flat, strainable silicone membranes. Uniform strains up to 25% are possible and up to six, 20mm-diameter wells can be stretched simultaneously using a single, inexpensive base unit.

Base Unit

The MechanoCulture base unit has eight synchronous motor-driven pins that move radially so as to stretch a specially designed silicone membrane that includes a 20mm-diameter by 5mm deep well with cover plate. The Base Unit is 110mm X 130mm X 70mm and it can stretch up to 6 membranes at one time. Strain rates ranging from 10% per second to 0.01% per hour can be specified as can peak equi-biaxial strains ranging from 1% to 25%. Tests can be as simple as a single stretch cycle or they can be so complex and long that they take weeks to run.

Computer Control

The base unit is programmed using a graphical user interface (GUI) that runs on a PC and a USB cable. Once it is programmed, it can be disconnected from the PC and transferred to an incubator where it is connected to a 12V power supply. A run/pause button is used to initiate, pause and stop the test. An LED display indicates the state of the unit, including the number of cycles remaining in the original protocol. The base unit can be stopped and disconnected from its power source without losing track of its position in the protocol.

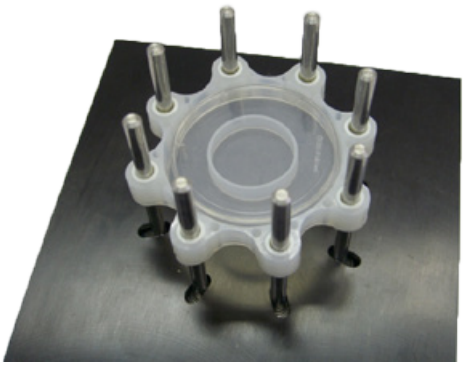

Fig.2—The base unit posts move radially to stretch a silicone membrane from 1–25%.

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Carrier

A special carrier allows membranes to be removed from the MechanoCulture base whenever it is paused or stopped. Thus, cultured cells can be observed and imaged on an inverted microscope in their original or deformed state.

The system is designed to be scalable and cost effective. Each base unit operates independently so that different strain-time protocols can be run simultaneously. Individual base units can be moved from one incubator to another or from one lab to another, thus providing maximum flexibility.

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