Cell growth synchronizer

Introduction:
The presented technology relates to a new method of production of synchronized adherently growing cell lines that can be used especially in laboratories for basic and applied research, and provides also a complete technological solution for carrying out said method.
Cell line growing techniques are an integral part of work for many biological, biotechnological and medical laboratories. One of the aspects of cell population growth is asynchronicity, which means that the cells go through the stages of the cell cycle at different pace. This heterogeneity of the cell population represents a serious problem for many experimental procedures because cells in different phases of the cell cycle vary in physical, physiological, biochemical and genetic properties. Typically, having a homogeneous synchronous cell population is a laborious task, achieved by either separation of the cells (using sorters or counter-flow elutriators) or by chemical synchronization of the cell growth (manipulation of growth factors, inhibitors of replication, inhibitors of mitosis, permanent checkpoint activators). Among disadvantages of standard methods, stress, irreversible genomic changes and/or high demands on special equipment and laboratory personal are counted.
Our invention aims at eliminating the negative effects of the commonly used synchronization methods and at the same time decreasing the financial, time and operational intensity of this important laboratory procedure. The method explores natural principle of anchorage dependence of the cellular growth which is shared by most adherently growing cell lines cultivated in-vitro.

Technology description:
Reversible proliferation block of adherently growing cells in a specific phase of cell cycle based on anchorage dependence mechanism is achieved by using a specialized device. The conception of the device equipped by its own high-power battery allows the usage in standard cell incubators and is fully compatible with standard tissue culture plastic. The device consists of a special vibration unit which causes a defined vibration deflection of a freely suspended platform. This vibration causes a movement of the culture medium in a standard culture bottle which is firmly attached to the platform with elastic straps. Such defined mechanical forces are causing a release of mitotic cells into suspension because they are physiologically incapable of full adhesion. Released cells are prevented from adhering again by the constant vibrations. Such induced change of anchorage during mitosis stops in multiple cell lines further proliferation in late telophase and/or early G1 phase. This inhibition of proliferation is non-toxic and fully reversible within the subsequent 24 hours. Once the inhibited cells are allowed to adhere to the bottom of the culture bottle, they continue to grow. Thus, prolonged cultivation of a normal exponentially growing adherent cell population on the device creates rich suspension of proliferation-inhibited cells which is an ideal basis for a new cell population which for experimental reasons needs to be homogenously synchronous in the terms of the cell cycle phase.

Advantages:
Our product offers a unique way for obtaining synchronized cell population reversibly arrested in late telophase with minimum stress affecting the cells fitness. Moreover, its production is inexpensive and the system is compatible with standard laboratory equipment and consumables. It is also easy to use and its primary purpose of usage can be extended to a programmable self-powered shaker usable for other lab-techniques.

Development status:
Prototype. Validation studies on different cell lines

Commercial offer:
Exclusive/non-exclusive license to the know-how and data

Ownership:
Institute of Molecular and Translational Medicine, Faculty of Medicine and Dentistry, Palacky University, Olomouc

Contact:
More information is available upon signing a CDA/NDA. Please contact IMTM´s director (director@imtm.upol.cz) or the technology transfer office (tto@imtm.upol.cz)