

4281 The Development of a Three-Dimensional Microscale Cell Culture Analog Device for Toxicity Study

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A cell culture analog (CCA) system is a device for in vitro prediction of systemic response of an animal or human to chemical exposure or to delivery of drugs. Cells grown on microscale chips can be used to evaluate the effects of drugs and chemicals at an early stage, at molecular and cellular levels. Such devices are called microscale cell culture analog (microCCA). The microCCA devices could be constructed by using silicon or polystyrene substrate. New generations of microCCA systems with cells cultured three-dimensionally in gels (Matrigel, Collagen, Alginate, Agarose or Gelatin) are under development. In three-dimensional cell cultures, the biological environment of real tissues can be better reproduced. A new microCCA chip specifically designed for gel-based cell culture is proposed. It has more realistic liquid-to-cell ratio. The geometry of the chambers was also changed to enable the application of fat mimic materials in the fat chamber so we can study the bioaccumulation of toxicant. The modified geometry also facilitates fabrication. Compared with animal experiments, this new technology is faster, cheaper, more efficient and much less complicated in result interpretation.