



12

28-day microphysiological monitoring of human hepatocellular cells

Joachim Wiest

cellasys GmbH, Munich, Germany

Hep-G2 human hepatocellular carcinoma cells were seeded onto BioChips and monitored for 28 days by means of extracellular acidification and morphology using the IMOLA-IVD system. 24 h prior to the start of the experiment 100,000 Hep-G2 cells were seeded in 300 μ l medium onto the BioChip and incubated in a CO₂-incubator (5%) using standard buffered medium to let the cells adhere to the surface of the BioChip. After pre-incubation, pictures of the transparent BioChip were taken, showing a confluent monolayer of the cells. During the course of the 28-day experiment, the cells were supplied in a stop and go mode (5 min off, 5 min on) with RPMI 1640 medium without sodium bicarbonate, with Gentamicin and 10% fetal bovine serum (FBS). L-Glutamine (day 10) and FBS (day 16) were added to investigate if resupply of those substances is necessary to achieve the long term monitoring. After 28 days, 10% SDS was added as a positive control. Pictures after the experiment show that the cells were lysed by the SDS. Extracellular acidification was monitored using a pH-microsensor and morphology of the cells was monitored with an interdigitated electrode structure. The microsensors were read out about every

10 seconds. A stable extracellular acidification rate established after about 2 h. The real part of the impedance value decreased during the first days until it was stable after day 5. The results show that multiparametric, label-free, long-term monitoring of a living human cell line is possible and paves the way for development of new microphysiological models e.g. mimicking the OECD guideline for repeated dose 28-day oral toxicity study in rodents (OECD TG 407). This work was funded by the German *Bundesministerium für Bildung und Forschung* during the BIOGRAPHY project, BMBF No. 02PN2241. The author want to thank the *Deutscher Tierschutzbund – Akademie für Tierschutz* (German Animal Welfare Federation – Animal Welfare Academy), Neubiberg, Germany and the colleagues at *Heinz Nixdorf-Lehrstuhl für Medizinische Elektronik* of *Technische Universität München*, Munich, Germany.

Reference

Weiss, D., Brischwein, M., Grothe, H. et al. (2013). 35th Annual International Conference of the IEEE EMBS, Osaka, Japan, 3-7 July, 2013, 1607-1610, Corrigendum I.