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LETTER TO THE EDITOR

Choosing an appropriate glucose concentration according to different cell types and experimental purposes is very important

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Dear Editor,

We have read the article "Improvements in the primary culture of neonate rat myocardial cells by study of the mechanism of endoplasmic reticulum stress" (Qiqi et al. 2013) with great interest. First of all, we would like to congratulate the authors for an excellent study. The authors confirmed that endoplasmic reticulum stress (ERS) can be exhibited in the conventional protocol of primary culture of neonate rat myocardial cells (NRMCs) and that the high glucose concentration (25 mM) in the culture medium might be the cause. They proposed that medium-glucose concentration (11.1 mM) in culture media should be used and described an improved protocol for primary culture of NRMCs.

This report is inconsistent with previous findings showing that high glucose can induce ERS (Yimin et al. 2012; Zhang et al. 2013). As we know, it is very important to use correct concentrations of D-glucose in a culture medium to keep the cells in normal condition and to get the correct experimental results especially for the diabetes research. D-Glucose concentration in a culture medium for different types of cells might be different because of differences in their physiological state. To those like endothelial cells, macrophages, and astrocytes, 5 mM D-glucose might be appropriate (Huawei et al. 2013; Kaplan et al. 2010; Gandhi et al. 2010). However, to other cells such as cortical or hippocampal neurons, optimal survival rate and neurite growth may require much higher basal D-glucose (e.g., 25 mM), reflecting the fact that neurons have high metabolic rates. A neurobasal medium containing 25 mM D-glucose as a control condition meets these metabolic requirements and is commonly used for neuronal cultures (Meng et al. 2013). In this case, some studies have used more than 40 mM D-glucose to model high-glucose-induced cell injury associated with the diabetic condition (Wohnsland et al. 2010; Xu et al. 2012). In addition to different cell types, selecting an appropriate glucose concentration according to different experimental purposes is also very important. Using 16.1 mM D-glucose CSC medium as control, Fumisato et al. detected the effects of changing concentrations of D-glucose on adherence of human neutrophilic polymorphonuclear leukocytes (PMN) to human retinal endothelial cells (HRECs). Although the concentration of D-glucose in the control medium is relatively high, it is necessary to obtain the confluency of HRECs (Fumisato et al. 2006). Tingsong et al. found that with periodic versus constant high glucose, the reaction of the human coronary artery endothelial cells to injury was obviously different (Tingsong et al. 2013). This is consistent with the current study which further confirms that basal state of a cell affects its response to injury factors.

In addition, since the osmolality affects cell morphology and functions, mannitol or L-glucose could have been used as an osmotic control in the current study to determine the true effect of changing D-glucose concentration on ERS and cell injury. Moreover, potential changes in marker proteins such as CHOP and caspase-12, proliferation, and apoptosis of the cells should also be examined as well.

In summary, it is very important to choose an appropriate glucose concentration in the culture medium according to individual cell types and experimental purposes.

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