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Cytotoxicity studies of combination of proteasome inhibitor Velcade and hyperthermia

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One of perspective methods of cancer treatment is the induction of apoptosis ('programmed cell death') in malignant cells. The apoptosis can be stimulated by various factors: biological, chemical and physical. We investigated cytotoxic effect of combination of pharmacological apoptosis modulator Velcade (Janssen-Cilag Pty Ltd) and hypethermia. The cytotoxicity was studied for 5 concentrations of Velcade (1, 2, 3, 4 and 5 ng/ml), three types of temperature (40, 42 and 44°C), and two types of cancer cells (human melanoma C-32 and human monocytic leukaemia U937 lines). The results demonstrated that Velcade in all 5 concentrations was able of suppress the viability of U937 cells. The decrease in cell survival rate was in a direct correlation with the increase of drug's concentration. The maximal level of dead cells was detected for 40°C for all concentrations of Velcade. However, the acquired data showed that the augmentation of temperature up to 42°C and 44°C resulted in the rise of number of viable cells. These findings indicate that high temperatures have a cyto-protective effect. The possible mechanism may lay in the ability of mild hyperthermia to promote cell growth. The second feasible explanation is a negative impact of high temperature on Velcade's pharmacodynamics. The data of cytotoxicity studies of C-32 cells showed a similar picture. The elevation of temperature led to the decrease of cells viability. Notably, the highest temperature (44°C) had a cyto-protective effect too. In conclusion, our findings indicate that combination of apoptosis modulator Velcade and mild hypethermia can be effectively employed for the elimination of cancer cells.

Biography

Timur Saliev, is a Lead Scientist and obtained his PhD (Bio-physics) at the University of Dundee (United Kingdom), Medical degree (MD) from Tashkent Pediatric Medical Institute (Uzbekistan) with specialization in Anesthesiology & Intensive care; M.Sci. (Bio-physics) obtained from Wageningen University (Netherlands). His areas of research interest inclyde bio-physics, therapeutic applications of ultrasound and other non-invasive physical modalities, nano-technology, cancer treatment, imaging, drug & gene delivery systems, advanced microscopy, medical robotics, pharmacology and development of medical devices and instruments. Currently, he is supervising projects related to bio-physics at the Center for Life Sciences (NLA, NU).

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