Proliferation constant study of the CRL-1888 mouse tumor cell-line for the application of hyperthermia animal model

Young Kon Kim and Eun Mi Hwang.
Dept. of Biomedical Engineering Inje University, Korea.

Purpose
This study is to investigate the proliferation characteristics of the CRL-1888 mouse tumor cell line at eleven different temperatures, which is very useful parameter for designing an interstitial thermo-seed hyperthermia animal tumor model.

Methods
The CRL-1888 mouse tumor cell line was acquired from the American Type Culture Collection (USA). Cell medium was prepared with the mixture of the Dulbecco's Modified Eagle's Medium-low glucose (Gibco, USA), 10% Fetal Bovine Serum (Gibco, USA), 1% Penicillin-Streptomycin (Gibco, USA) and 1% of the 200mM L-glutamine (Gibco, Japan). The CRL-1888 Cells were taken out from the liquid nitrogen storage and thawed in an isothermal chamber (Koma Biotech, Korea). Cells were separated from the medium using a centrifuge (MF80, Hanil, Korea). The cells were cultured in a CO₂ incubator (BINDER CB-50, Germany) up to the number of 6x10⁶. Ten thousand CRL-1888 cells were selected and put them into a φ100mm cell-culturing Petri dish and then incubated at eleven different temperatures; i.e. 36, 37, 38, 39, 40, 41, 42, 43, 44, 45 and 46 and for seven different incubation times; i.e. 24, 48, 72, 96, 120, 144 and 168hours. Every culturing test was repeated for three times. Microscopy assay was tested with optical microscope (CK40-F200, Olympus, Japan) at the x200 magnification. Cellular viability was tested using the Trypan blue exclusion method. The number of cells in 10μl were measured with a Hemocytometer(Marienfeld, Germany).

Results
The number of cells incubated at 37 for 24hous were 2.9x10⁴. This figure indicated that the cells were proliferated about 2.9 times more than the initial number of 1x10⁴ at this condition. At the same temperature, the cells were proliferated about 66 times more than the initial one during 168 hours incubation. Every culturing test was repeated for three times. Microscopy assay was tested with optical microscope (CK40-F200, Olympus, Japan) at the x200 magnification. Cellular viability was tested using the Trypan blue exclusion method. The number of cells in 10μl were measured with a Hemocytometer(Marienfeld, Germany).

Figure 1. Cell counts of the CRL-1888 after incubations at eleven different temperatures.

Figure 2. Graphs of the proliferation constant k of the CRL-1888 mouse tumor cell line at eleven different testing temperatures. The k value is conversed to negative above 42°C.

Conclusion:
In this proliferation study, we had found that the conversion temperature of the proliferation constant k of the CRL 1888 cell line is 42°C. This conversion temperature would be a very useful parameter for designing a thermo-seed size and heating characteristics for hyperthermia of the animal tumor model.

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References
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