134 Study on the Mechanism of Fluid Percussion Injuries on Immune Cells

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Introduction

In vitro models of traumatic injury are helping elucidate the pathobiological mechanisms responsible for dysfunction and delayed cell functional variation after mechanical stimulation of the single waveform pressure. It is likely that injury outcome is related to the biomechanical parameters of the traumatic event such as amplitudes and durations. However, the influence of impulsive pressure on endothelial function has not yet been fully studied in vitro. In this study, we developed a pressure loading device that produced positive by modifying an in vitro fluid percussion model and examined the effects of the pressures on macrophages' basic functions.[1][2]

Methods

To model variations in the biomechanical injury parameters and simplify the experiment, single-use syringe was chosen to be the cell container and a drop hammer driven fluid percussion injury system (FPI) was designed and built to generate a single waveform with adjustable peak pressure and durations. Mice macrophage cells (Raw 264.7) were subjected to three types of the single positive pressure (120KPa, 550KPa and 1100KPa). Every 12 hours we detected its basic functions (including phagocytosis and proliferative capacity) during the following 48 hours, also the immediate cell death.

Results & Discussion

This single waveform pressure loading device could produce positive pressure with amplitudes of 70-1200KPa. After the pressure loading, there is no significant differences between the control cells and experiment cells. However, it does have a notable effect on its basic functions. The results showed that its phagocytosis and proliferative capacity were getting increasing with a peak value on 36 h and suddenly decreasing on 48 h. Moreover, these 4 regular curves are in proportion to the pressure.

Conclusion

Those results indicate that single waveform pressure have a main effect on cell's biological functions, not on cell death. And these effects on functions did have a regular functional relationship. To explore more regular curves and the mechanism, we need more experiments such as genomics technical.

References

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