Ken Hayashi, J Cell Sci Ther 2011, 2:4
doi: http://dx.doi.org/10.4172/2157-7013.S1.10

OMICS Group Conferences
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International Conference & Exhibition on
Cell Science & Stem Cell Research

29 Nov - 1 Dec 2011 Philadelphia Airport Marriott, USA

The molecular mechanism of autophagy in auditory cells under oxidative stress

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The purposes of this study are to elucidate how oxidative stress exerts its cytotoxic effects on auditory cell line (HEI-OC1) and to uncover the molecular mechanism of autophagy in auditory cells under oxidative stress. We used HEI-OC1 in this study. The viability of HEI-OC1 was determined by cell viability assays. The samples after treatment of HEI-OC1 were analyzed by a FACscan flow cytometer. Electron microscopy and morphometric analysis were performed at x6000. Immunofluorescent confocal laser microscopy was used. For protein analysis, western blot was performed. HEI-OC1 treated with different concentrations of H_2O_2 for 0.5 h and 1 h exhibited the dose- and time-dependent cell death. After H_2O_2 treatment, not apoptotic cell but necrotic cell was detected by FACscan analysis. H_2O_2 treatment induced formation of autophagic vacuoles in HEI-OC1. On the other hand, the pretreatment of HEI-OC1 with ATP and rapamycin protect against H_2O_2 –induced necrotic cell death. In addition, not only the treatment with H_2O_2 but also the pretreatment with ATP and rapamycin induced autophagy. The expression of GFP-LC3 was induced in not only H_2O_2 but also ATP and rapamycin-treated HEI-OC1 under immunofluorescent confocal laser microscope. After treatment with ATP and rapamycin, the accumulation of LC3-I/II ratio was observed, and the expression of ATG7 was induced in H_2O_2-treated HEI-OC1. Consequently, we demonstrated a promotion of autophagy through the mTOR signaling pathway to enhance cell survival in auditory cells under oxidative stress. These findings are believed to bear relationships for understanding the complex relationship among oxidative stress, autophagy and cell death in auditory cells.

Biography

Ken Hayashi has completed his MD from Tokai University in 1995, his PhD from Hiroshima University in 2000 and postdoctoral studies from University of California, San Diego. He is an assistant director of Shinkawa Clinic. He has published more than 20 papers in reputed journals and serving as an editorial board member of Journal of Cell Science & Therapy.