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	作成者: Nesa, Badrun, Hidaka, Michio, 日高, 道雄
	メールアドレス:
	所属:
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PG -21 Studies on cell death mechanisms of corals under thermal stress

Badrun Nesa¹ and Michio Hidaka²

¹Department of Marine and Environmental Science, ²Chemistry, Biology and marine Science, University of the Ryukyus, Nishihara, Okinawa 903-0213, Japan

We have established an experimental system to study the response of coral cells to stress treatment using coral cell aggregates (tissue balls). Dissociated coral cells aggregate to form spherical bodies, which rotate by ciliary movement. These spherical bodies (tissue balls) stop their rotation and become disintegrated when exposed to stress. A significant negative correlation was found between survival time of tissue balls and zooxanthella density. This suggests that zooxanthellae produced active oxygen species under the stress condition. The objective of this study was to study cell death mechanisms of coral using tissue balls as experimental system. Tissue balls prepared from dissociated cells of Pavona divaricata and were exposed to elevated (31°C) and control temperature (25°C) under normal light (35 μ mol m⁻²s⁻¹) for 6.30 h. Cell death mechanisms were investigated using a Comet Assay (single cell gel electrophoresis), which can detect DNA damage in individual target cells. Apoptotic death of coral cells was detected in tissue balls exposed to high temperature stress but not in the control tissue balls. Significant difference was found in the length of comet tails between treated and control tissue balls (* p< 0.05). This together with our previous finding of negative correlation between zooxanthellae density and survival time of tissue balls, suggested that zooxanthellae under stress produce harmful substance which induce apoptotic death of host cells. To understand the role of zooxanthellae in apoptotic cell death of host cells more clearly, we will investigate the effects of antioxidants and chemicals which inhibit the fixation of CO₂ on the frequency of apoptotic cell death in tissue balls. Cell death mechanisms of coral and zooxanthella cells under various stress conditions will also be investigated by using transmission electron microscopy.

Key words: Coral, apoptosis, comet assay, zooxanthellae