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Accumulation of Element Ti in Macrophage-like RAW264 Cells Cultured in Medium with 1 ppm Ti and Effects on Cell Viability, SOD Production and TNF-α Secretion

Masayuki TAIRA[1)], Kaori SASAKI[1)], Setsuo SAITOH[1)], Takashi NEZU[1)], Minoru SASAKI[2)], Shigenobu KIMURA[2)], Kazunori TERASAKI[3)], Kouichiro SERA[3)], Takayuki NARUSHIMA[4)] and Yoshima ARAKI[1)]

1) Dept. of Dental Materials Science and Technology, Iwate Medical University School of Dentistry
2) Dept. of Oral Microbiology, Iwate Medical University School of Dentistry
3) Cyclotron Research Center, Iwate Medical University
4) Tohoku University Biomedical Engineering Research Organization (TUBERO), Aobayama Materials Science Branch

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Abstract:
The adverse effect of Ti on body-defense macrophage is not well understood. The aims of this study were twofold: (1) to examine the intracellular accumulation of Ti element; and (2) to measure the cell viability, superoxide dismutase (SOD) production, and TNF-α secretion of macrophage-like RAW264 cells cultured for two days in medium with 1 ppm Ti prepared from acidic ICP Ti standard solution. PIXE analysis showed that element Ti was accumulated up to 7.3 ppm in RAW264 cells when cultured in the medium with 1 ppm Ti. Further, RAW264 cells cultured in the medium with 1 ppm Ti exhibited cell viability of about 60%, SOD production of about 180%, and TNF-α secretion of about 170% relative to those of control cells cultured in the medium without Ti. It was speculated that phagocytosis of minute Ti-containing complex (mostly TiO_2) by macrophage caused oxidative stress and inflammatory reaction, leading to cell proliferation arrest and increased production of SOD and TNF-α.

Key words:
Macrophage, Titanium, Phagocytosis

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