【別紙２】

論文名： Bioactivity and biomineralization ability of calcium silicate-based pulp-capping materials as evaluated with subcutaneous implantation into rats

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Aim To evaluate the abilities of three calcium silicate-based pulp-capping materials (ProRoot MTA, TheraCal LC, and a prototype tricalcium silicate cement) to produce apatite-like precipitates after being subcutaneously implanted into rats.

Methodology Polytetrafluoroethylene tubes containing each material were subcutaneously implanted into the backs of Wistar rats. At 7, 14, and 28 days post-implantation, the implants were removed together with the surrounding connective tissue, and fixed in 2.5% glutaraldehyde in cacodylate buffer. The morphology and chemical composition of the surface precipitates formed on the implants were analyzed with scanning electron microscopy-electron probe microanalysis (SEM-EPMA). The distributions of calcium (Ca) and phosphorus (P) at the material-tissue interface were also analyzed with SEM-EPMA.

Results All three materials produced apatite-like surface precipitates containing Ca and P. ProRoot MTA produced larger precipitates (in diameter) than the other materials. For each material, elemental mapping detected a region of connective tissue in which the concentrations of Ca and P were higher than those seen in the surrounding connective tissue (the Ca- and P-rich area). The thickness of this region exhibited the following pattern: ProRoot MTA > prototype tricalcium silicate cement > TheraCal LC, and significant differences were detected between all pairs of materials at all time points, except between the prototype cement and TheraCal LC at 7 days ($P < 0.05$).

Conclusions After being subcutaneously implanted, all of the materials produced Ca- and P-containing surface precipitates and a Ca- and P-rich layer within the surrounding tissue. The thickness of the Ca- and P-rich layer differed among the materials.