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Improvement of mechanical properties of CPC and MTA by Elastin-Like-Polypeptide

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The aim of this study is to develop a new elastin-like polypeptide (ELP) supplemented dental repairing cement which shows improved mechanical and handling properties. ELP genes either with or without octaglutamic acid termination were genetically engineered: V125 and V125-E8. Pure ELPs were gathered through a series of protein synthesis process using E.coli through gene transformation, expression, protein purification. 10 wt% ELP solutions were prepared and mixed with mineral trioxide aggregate (MTA) and calcium phosphate cement (CPC) to have liquid to powder ratio from 0.2 to 0.7. Mechanical property test and washout test were performed to validate the availability of ELP-MTA mixtures as improved dental repairing cement. In compressive tests, we prepared from 0.2 to 0.7 'liquid : powder' ratio samples: two powder of CPC and MTA; three liquids of DW, V125, V125E8. Mixed cements as given ratio, were loaded at mold and set in 37°C incubator for 4 days as column shape. Each samples were tested in universal testing maching AGS-X (SHIMADZU, Japan). Anti-washout test was performed with the mixed cement of 0.5 liquid/powder ratio. Each mixed cements soaked with 370HEPES solutions on petri dish were observed at 5 minite, 1 hour and 24 hour. After drying in 37′ incubator for 48 hours, the loss weight of cements were also measured. The ELP supplemented MTA and CPC showed a significantly enhanced compressive strength and anti-washout property. Incorporation of specific ELP enhanced the mechanical strength and handling property of MTA and CPC. This preliminary test indicates that ELP can be used to develop the inorganic dental repairing cement to have improved properties.

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