1364 Effects of Hydrolytic Degradation on In Vitro Biocompatibility of Poly(d,l-lactic acid)

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Objective: In order to investigate the effects of hydrolytic degradation on the biocompatibility of poly(d,l-lactic acid) [P(d,l-LA)], the initial attachment of MC3T3-E1 osteoblast-like cells on various degraded P(d,l-LA) disks were assessed. **Methods:** MC3T3-E1 cells were seeded on P(d,l-LA) disks (10 mm in diameter and 1.65 mm in thickness) that had been degraded by immersion in a hydrolyzing medium for (0 to 4) weeks. The cell spread area was measured with a fluorescence microscope after staining the plasma membrane with a fluorescent dye. The focal adhesion of the cells was also investigated by immunofluorescence staining of vinculin. **Results:** The cell spread area of cells on P(d,l-LA) disks that were not degraded did not differ significantly from that of cells on tissue-culture polystyrene, but the degradation of P(d,l-LA) disks affected cell spreading. The cell spread area decreased linearly with the degradation time of the disks at a rate of (-741 ± 307) μm^2/week (all uncertainties quoted are expanded uncertainties at the 95% confidence level). Compared with the cells on non-degraded P(d,l-LA) disks, cells on P(d,l-LA) disks that were degraded for 4 weeks also showed irregular morphology. The number of live cells [up to (2.099 ± 0.268) cells/mm^2 in $\log_{10}$ units, depending on the measurement location within the samples] on P(d,l-LA) disks also decreased linearly with the degradation time of the disks at a rate of up to (-0.175 ± 0.064) (cells/mm^2)/week in $\log_{10}$ units, again depending on the measurement location within the samples. Focal adhesion began to disappear for cells on P(d,l-LA) disks degraded for 1 week. **Conclusions:** These results indicate that degraded P(d,l-LA) is less biocompatible than non-degraded P(d,l-LA), and focal adhesion is a more sensitive monitor of the biocompatibility of degraded P(d,l-LA) than cell spread area. Y1-DE-1021-02