the free polar energy and biological parameters are correlated. The question is now whether the different values of θ (and of the free polar surface energy) can be related with the real chemical state given by FTIR and ESCA. The preliminary results of FTIR show that there is a different intensity of IR reflection indicating different occupation of the surface by the carboxyl and carboxyl group at CFRC in comparison with CFRC/PyG. No differences in FTIR spectra were found on surfaces with the same chemical nature but different roughness. One reason for the differences in surface free energy may be connected with the change in the ratio of the real area to the geometrical area of the surface in question.

Conclusion

The results indicate a different relation between biological response and free surface energy for roughness (with the same chemical state) and for chemical state (with the same roughness). The results of reflection sputtering, FTIR, and ESCA need to be compared.

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References

Number of MG63 cells on CFRC on day 4 after seeding.

pyrolytic carbon (group #3). Previous grinding or further polishing with metallographic paper and diamond paste had only a relatively little or even no additional effect on the improvement of cell growth, although this treatment markedly enhanced the cell spreading (FIG. 2A, B). Further experiments focused on beta-1 integrins, considered as the most important extracellular matrix receptors on osteogenic cells (Gronthos et al. 2001), and osteocalcin, a marker of osteoblastic differentiation [Josset et al. 1998], were carried out only on cells cultured on control unmodified and pyrolytic carbon-coated CFRC (group #1 and #3). As revealed by the enzyme-linked immunosorbent assay (ELISA), the concentration of beta integrins and osteocalcin, measured in 6-day-old cultures per mg of total cell protein, was significantly higher (by 30±5% and 14±6%, respectively) in cells cultured on samples covered with pyrolytic carbon than in cells on unmodified composites. Moreover, the coating with pyrolytic carbon represented in our experiments the best protection against release of calcium microparticles from CFRC. It can be concluded that coating CFRC with pyrolytic carbon seems to be the most promising surface modification improving the compatibility of CFRC with bone-derived cells.

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