

Guiding Bone Regeneration Using Surface Hydrophobized Silk Fibroin Nanofibrous Membranes

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Abstract (Arial 10)

Guided bone regeneration (GBR) method is a well-established therapy to repair mandible and alveolar bone defects infected by periodontal diseases.[1,2] The principle of GBR method is to prevent an invasion of non-functional scar tissues. Silk fibroin (SF) is widely used for tissue engineering scaffold because of their biocompatibility, biodegradability and minimal inflammatory reaction.[3] In this study, SF nanofibrous mats were fabricated by simple electrospinning method.[4] The SF nanofibrous mats were characterized by SEM. Conformational change of SF was induced by water vapor treatment from random coil to β -sheet structures determined by ATR-FTIR, ¹³C CP/MAS NMR. The water vapor treatment was strongly dependent on the treatment time and temperature. After CF₄ gas plasma treatment, the surface of SF nanofibrous mats changed to highly hydrophobic surface. [5] The fibroblasts' viability on CF₄ gas plasma treated and untreated SF nanofibrous mats were determined by MTT assay. Cell adhesion and proliferation was highly suppressed by hydrophobic CF₄ gas plasma treatment. . The tissue barrier effect of hydrophobized SF nanofibrous mats was confirmed by calvarial defect model of New Zealand white rabbits. SF nanofibrous mats with extremely hydrophobic surface prevented soft tissue ingrowth and promoted new bone for matrix as GBR membranes. In conclusion, the fluorine gas plasma treated Silk fibroin nanofibrous mats should be useful as guided bone regeneration(GBR) membranes.

References

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Figures

