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**An exploration of plastic deformation dependence of cell viability and adhesion in  
metallic implant materials**

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**Abstract**

The relationship between cell viability and adhesion behavior, and micro-deformation mechanisms was investigated on austenitic 316L stainless steel samples, which were subjected to different amounts of plastic strains (5%, 15%, 25%, 35% and 60%) to promote a variety in the slip and twin activities in the microstructure. Confocal laser scanning microscopy (CLSM) and field emission scanning electron microscopy (FESEM) revealed that cells most favored the samples with the largest plastic deformation, such that they spread more and formed significant filopodial extensions. Specifically, brain tumor cells seeded on the 35% deformed samples exhibited the best adhesion performance, where a significant slip activity was prevalent, accompanied by considerable slip-twin interactions. Furthermore, maximum viability was exhibited by the cells seeded on the 60% deformed samples, which were particularly designed in a specific geometry that could endure greater strain values. Overall, the current findings open a new venue for the production of metallic implants with enhanced biocompatibility, such that the adhesion and viability of the cells surrounding an implant can be optimized by tailoring the surface relief of the material, which is dictated by

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