Cyto-indentation 방법을 이용한 연골세포의 탄성계수 측정

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Measurment of Young's Modulus of Chondrocyte

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Key Words: Chondrocyte, Cartilage, Cyto-indentation, Young's Modulus, Tissue Engineering.

Abstract : Tissue engineering has been proposed to restore tissue composition, structure, and mechanical function. Previous studies showed that tissue engineered cartilage were grossly and histologically similar to normal natural cartilage, but the mechanical properties were significantly lower than those of natural cartilage. Before chondrocytes grow to form subcutaneous cartilage tissue, it was assumed that chondrocyte having the higher mechanical property might construct the better cartilage having improved mechanical performanc. A cyto-indentation technique was used to obtain the biomechanical Young's Modulus of a chondrocyte cell attached to glass surface. Piezo-transducer system and dual photo-diode system were used to conduct mechanical indentation through displacement-controlled testing and the measurement of corresponding cell reaction force. The Young's Modulus of chondrocyte, that was determined by elastic contact theory, was 1.38 kPa. The cyto-indentation technique employed in this study is so precise that it can quantify the biomechanical Young's Modulus of single cell.

안내궤도 차량부품 피로수명 예측을 위한 해석모델 개발

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The Development of a Computational Model for Fatigue life Prediction of Guideway Vehicle Components

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Key Words: Guideway vehicle(안내궤도차량), Fatigue life(피로수명), Dynamic stress time history (동응력 이력), Finite element model(유한요소 모델)

Abstract : Guideway vehicle is used in the automobile, semiconductor and LCD manufacturing industries for transportation of products. Recently, as guideway vehicle has required more light-weight and higher operating speed, it comes to be of major concern to predict the fatigue life of the deformable components. It is necessary to obtain the dynamic stress time history for fatige life prediction. In this study, Dynamic model of guidway vehicle is developed by using the multi body dynamic analysis program and finite element models of wheel and main frame is developed. The result of dynamic analysis was verified by the vehicle traveling test. and Finite element model is verified by the wheel compression test. With these results, we developed the reliable dynamic and finite element model.