

Computer Simulation of Female Urinary Incontinence

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Objectives: The purpose of this study is to establish pressure, distension and other parameters involved that produce tissue injury during vigorous physical activities in women, so that superior methods and devices for diagnosing and treating urinary incontinence (UI) can be created. **Background:** A higher prevalence of daily UI in a female athlete population was found compared to that of a randomly selected and age matched sample population, but the mechanism of UI is not clearly understood. **Methods:** Mechanical tissue properties of affected organ structures were determined by using specimens from cadavers. A realistic geometric model of the female pelvis was developed from patients' specific

CT images. The finite element model was built by combining the mechanical tissue properties and the geometry of organs involved, and the finite element analysis (FEA) was then performed using ABAQUS 6.7 to simulate the biomechanical response of the female pelvis during physical activities. **Results:** Tissue specimens from 11 cadavers were tested which included specimens of the bladder, uterus, pelvic muscle, vagina and urethra. A finite element model was built with approximately 500,000 tetrahedral elements. The force level and resulting organ displacements in the female pelvis during physical activities were investigated successfully by using the FEA method. **Discussion:** The knowledge of force level and organ displacements during physical activities helps to understand the mechanisms of UI occurring during physical activities.