A STUDY OF THE BEHAVIOR OF THE FEMUR AS A SHOCK ABSORBER IN ALPINE SKIING EVENTS - A FINITE ELEMENT METHOD APPROACH

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INTRODUCTION: The analysis of what happens during alpine skiing events is a challenge for everyone involved in their study (the athlete, the trainer, the engineer, the medical doctor). The value of the finite element method as a computational support is widely recognized. The main objective of the present study is to find answers to questions about the distribution of mechanical stresses over the femur in different cases encountered in alpine skiing events, especially when shocks appear.

METHODS: The study was realized in the following steps:
1) A medium-trained subject was filmed using classic techniques.
2) The image was analyzed, serving as a support for obtaining kinematics data.
3) The femoral geometry was reconstructed in terms of ANSYS v. 5.3 Finite Element package (Fig. 1).
4) From kinematics data and from the literature, the acting forces were determined and implemented in the model being considered.

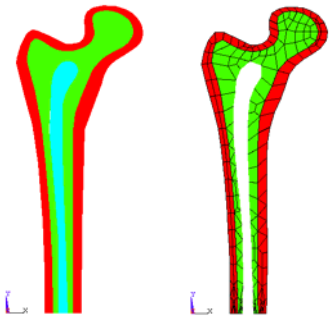

Fig. 1

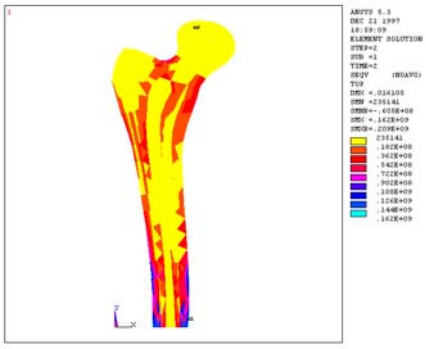

Fig. 2

RESULTS: The results are synthesized using the facilities provided by the post-processor of the finite element package used. For example, Fig. 2 shows the von Mises stress distribution over the structure considered in the case of a complex muscular action.

CONCLUSIONS: The present model presents some limitations in principle to the 2D limiting Character. It has some strong points also: implementing different levels of bone tissue, the complex took into consideration muscular action and the presence of bone marrow (which plays an important role in dissipating shock influences), The model is able to provide information about the magnitude of mechanical stresses that appear in different situations and can offer some training guidelines.