Introduction
Living cells are capable of recognizing and anticipating to mechanical deformations. However, excessive compressive deformations, in particular of highly susceptible muscle cells, can cause cell damage and may finally lead to the onset of deep pressure sores (decubitus). Currently, an adequate prevention of pressure sores is imparted by a lack of insight into the role of cell deformations on the occurrence of cell damage.

Objectives
- Obtain improved insight into the onset of cellular damage due to compressive deformations in a multiple cell environment
- Determine mechanically induced cell damage indicators related to pressure sores
- Develop numerical tools to predict the onset of cellular damage

Methods

Experimental
An in-vitro Tissue Equivalent (TE) is constructed by seeding a high density of cultured muscle cells into an agarose gel matrix [1].

Numerical Tools
To model muscle cell behavior in the gel specimen a multi-level finite element approach is adopted [2].

Results
In pilot experiments the fluorescent dye propidium iodide has been added to muscle cells in culture. Only in the nuclei of non-viable cells the red fluorescence is expressed and can be visualized using CLSM (fig. 3).

Discussion
- CLSM appears to be a promising technique to study cell damage
- More representative TEs need to be developed using suitable bioscaffolds to mimic muscle tissue
- Specific dyes to visualize different cell structures, such as the cytoskeleton and cell membrane, will be applied

References: