**Clinical study and multiscale modeling to predict the esthetic outcome of Breast Conservative Therapy.**

*1Remi Salmon, 1Thanh Chau Nguyen, 1Anne-Cecile Lesage, 1Marc Garbey, 2Barbara L. Bass
1Center for Computational Surgery, Houston Methodist Research Institute, Houston TX USA*

*2Department of Surgery, Houston Methodist, Houston, TX, USA*

*NSF I/UCRC CyBHOR*

Surgery for early stage breast carcinoma is either total mastectomy (complete breast removal) or surgical lumpectomy (only tumor removal) coupled with radiotherapy, commonly known as Breast Conserving Therapy (BCT). The goals of BCT are to achieve local control of the cancer as well as to preserve a breast that satisfies the woman's cosmetic, emotional and physical needs. However the cosmetic outcome of BCT remains however less than optimal in many of the cases.

In this poster, we describe a multiscale modeling to predict the esthetic outcome of Breast Conservative Therapy. Our model encompass multiple scales in space from cells to tissue, and time, from minutes for the tissue mechanics to months for healing. We use a modular method coupling mathematical models and corresponding software for patient specific data to test our hypothesis and refine the model. We designed a clinical study to collect data after and before surgery necessary to calibrate the modelisation of the different biomechanics phenomena in complex interplay: 3D breast shape evolution, inflammation due to surgery and radiotherapy and wound healing. We show validation results in 2D and 3D for BCT patients.