1145-92-693 **David A Hormuth II**, **Angela M. Jarrett**, **Ernesto A. B. F. Lima**, **Chengyue Wu**, **Ryan Woodall**, **Caleb Phillips** (thomas.yankeelov@utexas.edu) and **Thomas Yankeelov*** (thomas.yankeelov@utexas.edu), 1 University Station, C0800, Austin, TX 78712. *Linking multi-scale imaging with multi-scale modeling to predict the response of tumors to therapy.*

We will discuss our ongoing theoretical, pre-clinical, and clinical work employing serial measurements from time resolved microscopy and medical imaging to calibrate predictive, mathematical models of tumor growth and treatment response.

Our theoretical studies focus on developing mathematical representations that employ a combination of continuum mixture theory and the principal hallmarks of cancer. The immediate scientific goal is to provide a rigorous theory of tumor development, informed and validated by pre-clinical and clinical experimental data.

Regarding our in vitro, cell-scale experiments, we integrate pharmacokinetic and pharmacodynamic models with time-resolved fluorescence microscopy to quantify specific intracellular pathways contributing to therapeutic response to chemotherapy, and the effect of glucose concentration on tumor cell growth.

In the clinical setting, we use a system of mechanics-coupled, reaction-diffusion equations to predict the response of breast and brain cancers to therapy. Again, we use early, quantitative, MRI data to calibrate the model by predicting the observed response at the conclusion of therapy.

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